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An investigation of the shear stress  
distribution in a simply supported I-beam with  
a concentrated load acting near one end

Wright, Clarence Chandler; LaSpada, Jack Anthony

Cambridge, Massachusetts; Massachusetts Institute of Technology

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AN INVESTIGATION OF THE SHEAR STRESS  
DISTRIBUTION IN A SIMPLY SUPPORTED  
I-BEAM WITH A CONCENTRATED LOAD  
ACTING NEAR ONE END



CLARENCE CHANDLER WRIGHT  
JACK ANTHONY LA SPADA

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(Inter-Departmental)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, Mass.

Office of  
W. M. Murray  
Room 3-257

September 25, 1946.

Captain W. H. Buracker,  
Room 5-233

Thesis Work of LCDR C.C. WRIGHT, USN  
LCDR J.A. LaSPADA, USN

Dear Captain Buracker:

In response to your request for information on the thesis work carried out by Lt. Comdr. C. C. Wright and Lt. Comdr. J. A. LaSpada it is a pleasure to tell you that I have been very favorably impressed with the work which they have done and that I am hoping to find someone else to carry on where they left off.

These gentlemen selected an interesting and important problem which they attacked in a most thorough and businesslike manner. From the procedure which they adopted I am sure that they have gained valuable experience for themselves and at the same time I feel that they have produced results which will be of considerable value to other people interested in stresses in beams when conditions do not conform to the conditions and limitations of the beam theory.

In my opinion, the work of these two officers was of top notch caliber, and, in addition, it was a great pleasure to be associated with them in the capacity of thesis advisor.

Sincerely yours,

/s/ W. M. Murray

W. M. Murray



Cambridge, Massachusetts  
September 16, 1946

Professor J. S. Newell  
Secretary of the Faculty  
Massachusetts Institute of Technology  
Cambridge, Massachusetts

Dear Sir:

In accordance with the requirements  
for the degree of Master of Science in Naval Construction  
and Engineering, we submit herewith a thesis entitled "An  
Investigation of the Shear Stress Distribution in a Simply  
Supported I-Beam with a Concentrated Load Acting Near One  
End."





AN INVESTIGATION OF THE SHEAR STRESS DISTRIBUTION IN A SIMPLY  
SUPPORTED I-BEAM WITH A CONCENTRATED LOAD ACTING NEAR ONE END

By

Clarence C. Wright  
Lieutenant Commander, U.S. Navy  
B.S., U.S. Naval Academy, 1941

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Submitted in partial fulfillment of the  
requirements for the degree of  
MASTER OF SCIENCE IN NAVAL CONSTRUCTION AND ENGINEERING  
at the  
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1946



### ACKNOWLEDGMENT

The authors wish to express their appreciation and indebtedness to the following persons:

To Professor William M. Murray for his assistance and guidance in helping us select the approach to the problem.

To Mr. W. L. Walsh for his instruction in the use of strain gages, and for the use of his personal strain gage indicator.

To Mr. T. A. Hewson for instructing us in the correct procedure for use and application of Stresscoat, for suggesting the use of his strain rosette nomograph, and for other helpful suggestions on the details of this thesis.

To Mr. E. L. Sinclair and Mr. A. F. Lynch of the Materials Section, Boston Naval Shipyard, for their prompt procurement of the necessary materials.



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TABLE OF SYMBOLS

- A - Distance from load to near support, feet.
- a - Auxiliary page factor (no units).
- B - Distance from load to far support, feet.
- b - Thickness of beam at any position, inches.
- C - Distance of point from neutral axis, inches.
- E - Modulus of Elasticity, pounds per square inch.
- I - Moment of inertia of section, (inches)<sup>4</sup>.
- L - Length of beam span, feet.
- M - Bending moment at section, foot-pounds.
- Q - First moment of area outside of any line about the neutral axis, (inches)<sup>3</sup>.
- V - Vertical shear, pounds.
- W - Applied load, pounds.
- X - Horizontal distance from left support to any point, feet.
- $\epsilon'_1$  - Strain in micro-inches per inch measured by strain rosette in the vertical direction.
- $\epsilon'_2$  - Strain in micro-inches per inch measured by strain rosette in a direction equi distant from  $\epsilon'_1$  and  $\epsilon'_3$ .
- $\epsilon'_3$  - Strain in micro-inches per inch measured by strain rosette in the horizontal direction.
- $\epsilon_1$  - Corrected value of strain in micro-inches per inch measured in the vertical direction
- $\epsilon_2$  - Corrected values of strain in micro-inches per inch measured equi distant from  $\epsilon_1$  and  $\epsilon_3$ .
- $\epsilon_3$  - Corrected value of strain in micro-inches per inch measured in the horizontal direction.
- $\phi$  - The angle measured counterclockwise from  $\epsilon_3$  to the direction of  $\tau_m$  degrees.
- $\sigma_1$  - Vertical Direct stress, pounds per square inch.



$\sigma_3$  - Longitudinal direct stress, pounds per square inch.

$\tau_m$  - Maximum shear stress, pounds per square inch.

$\tau_{31}$  - Shear stress in the 3-1 plane, pounds per square inch.



## SUMMARY

### I. OBJECT

The object of this thesis investigation was to determine the shear stress distribution in a simply supported I-beam with a concentrated load acting near one end.

### II. PROCEDURE

An 8" x 4" x 8.6# aluminum I-beam was tested. This beam was supported 8 inches from one end; and by moving the supports, both length of span and position of load from near support were varied. Vertical static loads in increasing increments were applied in each position. (See Figure V for photograph of the laboratory set up.)

One series of test runs was made to obtain data from Stresscoat crack patterns. A second series of runs was made to provide data from SR-4 strain gage measurements.

### III. RESULTS

Plots of values of maximum shear stress at various points on the beam for each of four separate test runs are presented.

Strain gage data for the remainder of the strain gage test runs is included in Tables I to XVI.

Data obtained from each of the Stresscoat test runs, giving loading data and crack angles, are found in Tables XVII to XXXI.





## SUMMARY

### CONCLUSIONS AND RECOMMENDATIONS

#### CONCLUSIONS

The object of the thesis was attained in a practicable manner with good engineering accuracy.

The Stresscoat Method of Stress Analysis does not provide sufficient information to obtain quantitative values of shear stress, but does provide a good qualitative tensile strain picture of a loaded specimen.

#### RECOMMENDATIONS

This investigation should be continued for the entire series of I-beams in general use.

Further investigation should be made in such manner as to provide a maximum of data readings for each pattern of gages, to allow the graphical results expected to be easily paired.



## I. INTRODUCTION

### A. Concept of the Problem.

During World War II most structural investigations not directly related to winning the war were necessarily deferred. Among the investigations postponed by the Bureau of Ships, U.S. Navy, is the problem presented in this thesis: The Investigation of the Shear Stress Distribution in a simply supported I-Beam with a concentrated load acting near one end.

As stated by the Bureau of Ships in a letter to the authors, "The solution of this problem is of interest in the design of gun girders having a full web plate, in the design of many types of foundations for carrying concentrated loads, of flight deck longitudinals, and, in general, in all problems of transfer of load through shear in a beam. Ultimately, it is desired to make design recommendations in order to achieve greater economies when proportioning beams to resist shear."

Arbitrary limitations on this investigation, which is submitted as the first stages of a work which must certainly be continued to include the entire scope of this problem, were designated by the Bureau of Ships as being

1. The investigation of a flanged section, preferably a built-up or rolled "I" section.
2. The investigation of static conditions, in view of probable limitations imposed by laboratory facilities.
3. The study of the stress field produced under load in a flanged cross-section, rather than an investigation of methods of



reducing stress conditions.

#### B. Status of the Problem.

Preliminary search for published articles and texts relating to shear stress distribution in I-beam sections has resulted in the opinion by the authors, that no extensive tests to determine shear stress distributions in I-beams loaded other than at the center of the span have been undertaken.

In the preliminary analysis it was decided to limit the loading to values well below the elastic limit of the materials used, both to eliminate permanent deformation of the specimen during each test run and to obtain test conditions which would more nearly realize the loadings normally occurring in service.

The decision of the method of approach followed from examination of laboratory facilities available, which indicated that use of "Stresscoat" (Brittle Lacquer Method for Stress Analysis) would be valuable in searching for the general appearance of the stress field, at least the stress field formed by tensile and compressive stresses due to loading. Further, a transition from these general stress fields to specific quantitative shear stresses could be accomplished by solving for shear stresses from directional strains obtained from SR-4 type electric strain gages. The photo-elastic method of stress analysis was eliminated as an approach to our problem, for the present, on advice from the thesis supervisor, Professor Murray.

One factor which emerged from the preliminary analysis of the problem was the value of selecting a specimen which was a member of





a geometrically similar series; that is, which could be compared to either larger or smaller I-sections by ratios such as the ratio of depth of section to web thickness, or the ratio of depth of section to section modulus, etc. By this selection one of the variables present might be eliminated in the application of results of tests of one particular specimen to general practice. This process of selection was not employed. To reduce the project cost and to utilize surplus material, readily available, a single aluminum section was chosen arbitrarily with the following considerations:

1. The section depth was to be large enough to permit location of more than two rows of strain rosettes.
2. The length of section was to be short enough to provide a span well within the limits of the testing machine, yet great enough to allow the length of span to be introduced as a variable factor in the problem.

Presentation of results by graphical means (see pp **32 to 35**) appeared to be of value, in that, since a standard U.S. Navy I-section was tested the results could be directly applied to that section. A mathematical formulation of shear stress distribution in a beam of the type investigated (from test data obtained) was deemed too lengthy a problem for the short period allotted by the curriculum to thesis. However, it is hoped that the data obtained in this investigation are extensive enough to allow future transposition into a mathematical solution of the problem.





A comparison of the observed and theoretical value of shear stresses (obtained from simple beam theory formulas) is made to illustrate the divergence of these values.



## II. PROCEDURE

The essential steps followed in this investigation were as follows:

1. Selection of test specimen.
  2. Selection of method of testing and means of obtaining data.
  3. Determination of stress fields by use of Stresscoat, under varied conditions of span length and position of loading.
  4. Determination of strains at specific points by means of strain gages, under varied conditions of span length and position of loading.
  5. Calculation of value of maximum shear stress at each gage position from observed strain gage data.
  6. Calculation of theoretical maximum shear stress at each strain gage location from simple beam formulas.
  7. Comparison of observed and theoretical results.
- For detailed discussion or description of equipment and method of testing, see Appendix A.



### III. RESULTS

1. Plots of values of maximum shear stress obtained from strain rosette data and values of maximum shear stress obtained from simple beam formulas and Mohr's circle vs. distance along the beam are shown on pages **32** to **35**
2. Experimental Strain Gage Data are presented on pages **36** to **51**
3. Stresscoat Crack Angle Data are summarized on pages **52** to **59**
4. In the Stresscoat tests made in this investigation it was noted that the axis of vertical cracks in the lower half of the beam was in all cases displaced approximately one inch from the load position toward the center of the beam, irrespective of the beam span.
5. Superposition of the tension and compression Stresscoat crack contours showed that in most cases the intersections of the cracks obtained from the two different types of loading are perpendicular, as was expected.
6. Within the limits of the loads used, the angle of cracking at a given point in the Stresscoat crack pattern is independent of the load.



#### IV. DISCUSSION OF RESULTS

The results show that the shear stress distribution in a simply supported I-beam with a concentrated load acting near one end is not exactly that calculated from simple beam formulas and Mohr's Circle.

In general, the shear stress in the upper half of the web is greater than calculated values. In the lower half of the beam web the experimental and calculated shear stresses are in close agreement, except in the vicinity of the support, where an increase in shear stress is observed in all cases. In the upper half of the beam web the maximum value of shear stress does not occur at the position of loading, but the location of this maximum value is displaced towards the center of the span.

Not enough data had been worked up at present to determine accurately the effects of span length and position of load from near support on the ratio of observed maximum shear stress to calculated maximum shear stress.

It is believed that the Stresscont Crack Angle Data presented above could be combined with calculated values of direct stresses to give a maximum shear stress for comparison with that obtained from strain gage data.

Since for a particular test run the crack contours appeared identical and independent of load, a single loading near, but safely below, the elastic limit, coupled with the increased sensitivity produced by a "cooling" agent, should be sufficient to delineate the direction of principal stresses. In this respect,





too many test runs were made to obtain stress-strain data before the similarity between crack patterns appeared.

It is believed that the curves of results could have been faired more easily had a greater number of points been obtained by additional strain gage test runs.

The method of obtaining individual strain gage readings, that of using screw type binding posts to connect the test lead to the gage lead, though increasing the time necessary for each run, appears to give more accurate readings and simplifies the procedure of isolating any individual defective gage found.

In order to reduce one of the possible experimental errors, observed strain gage readings were faired to obtain values used in calculations. In some cases a greater number of observations would have permitted more accurate fairing. To allow presentation of similar curves for each test run, faired values corresponding to the same arbitrary loads were used for calculation in all cases.

The effect of reducing strains to even numbers is considered as negligible, since the load scale of the testing machine provided accuracy only to within 5 pounds.

The results are not as extensive as desired by the authors. However, it is believed that the results shown are representative of the shear stress distribution in an I-beam web under the conditions of loading selected for this investigation.



## V. CONCLUSIONS AND RECOMMENDATIONS

### CONCLUSIONS

1. The object of the thesis is considered accomplished.
2. The method used to obtain shear stress is practicable, and the nomograph solution provides engineering accuracy with saving of time.
3. Stresscoat runs revealed the following considerations.
  - a. Use of Stresscoat is advantageous in cases where an overall strain picture is desired. This would be particularly valuable in examinations of a complicated structure which could not be isolated or of which a model could not be built without excessive cost.
  - b. The use of CO<sub>2</sub> as a "cooling" agent is extremely useful, although matching observed and calibrated strains is not practicable under the cooled conditions.
4. A check on the accuracy of Stresscoat contours can be made by super position of the tensile crack pattern and the compression crack pattern.

### RECOMMENDATIONS

The authors recommend the following:

1. That this investigation be continued and enlarged to include tests of I-beams other than the 8" x 4" x 6.8" aluminum I-beam already tested, and that the results be coordinated to determine relations between observed test results on one material and anticipated results in another metal and to determine the influence of varying dimensions on shear stress distribution.



2. That in other investigations of this type, where application of Strescoat tests is contemplated, the greater proportion of available time be spent in quantitative strain gage tests rather than in qualitative Strescoat testing.

3. That in any continuance of this investigation the beam be tested in such manner as to provide data at shorter intervals than one reading for each six inches of beam length in each row of gages, and where practicable more rows of gages be introduced.



VI- APPENDIX





## APPENDIX A

### DETAILS OF PROCEDURE

#### A. DESCRIPTION OF APPARATUS

##### 1. BEAM

The aluminum I-section tested was an 8" x 4" x 6.6# rolled beam eight feet in length. The properties of this material (as determined from Section 6A13d, Navy Department Specifications, are as follows:

##### Physical:

Tensile Strength 22,000 lbs./sq in. (maximum)  
Elongation 18%

##### Chemical:

Magnesium	0.2 - 1.2%
Silicon	0.4 - 0.8%
Copper	0.15 - 0.4%
Iron	0.7% (maximum)
Chromium	0.15 - 0.35%
Zinc	0.10% (maximum)
Titanium	0.1% (maximum)
Manganese	0.15% (maximum)
Other elements	0.15% (maximum)
Aluminum	Remainder

The test section was **reannealed** by the following heat treatment:

1. Heat from room temperature to 850°F at rate of 50° per hour.



2. Bake at 850° for 2 hours.

3. Cool from 850° to room temperature at rate of 25° per hour. This section was selected for the following reasons:

1. It was dimensionally identical with the 8" x 4" x 18.4# steel I-section that is in general use in the U.S. Navy.

2. Its relatively light weight provided for ease in handling.

3. The externally applied loads required to produce reasonable deflections were well within the capacity of any testing apparatus normally used in laboratory examination.

4. The surface scale formation usually present was easily removed to provide the smooth surface prerequisite to even distribution of Stresscoat lacquer and necessary to establish a close bonding between strain gages and the metal.

## 2. TESTING MACHINE

The testing machine used in all test runs was the Riehle Universal Testing Machine, having a maximum capacity of 100,000 pounds. (See Figures IV and V.)

## 3. MEASURING DEVICES

### 2. STRESSCOAT

This material is manufactured by the Stresscoat Division, Magnaflux Corporation. Its application and interpretation followed,



basically, the principles set forth in the Stresscoat "Manual of Operating Instructions".

#### b. STRAIN GAGES, ETC.

The measuring gages were standard types of SR-4 Bonded Resistance Wire Strain Gages, of types illustrated in Figures I and II, manufactured by Baldwin Southwark Division, Baldwin Locomotive Works. Both single gages of types A-1 and A-5, and rectangular strain rosettes of type AR-1, were used. The single gages were located on the beam flanges where uni-directional stresses were expected. The strain rosettes were bonded to the beam web.

#### c. NOMOGRAPHS

As a means of reducing time of solution for shear stress from strain rosette data, the nomograph (See Figure III), developed by Mr. T. A. Hewson of the Division of Industrial Cooperation, M.I.T., was a very valuable aid. A comparison of accuracy of nomograph solutions and calculated solutions showed a difference of from 0.4% to 5% in over 100 cases.

### B. DESCRIPTION OF TESTS

#### 1. METHOD OF LOADING

The beam was subjected to various static loadings in the testing machine. There were no dynamic load tests due both to preliminary arbitrary limitations placed on the investigation and to lack of available facilities in the Materials Testing Laboratory. The arrangement of movable supports of the testing machine (see Figures IV and V) allowed for variation in length of





beam span and variation in distance between point of application of load and point of support, independent of each other. The supports and loading wedge were faced with one inch diameter half-round, transverse steel bars which provided support and loading, respectively, across the entire width of flange and of a length of not more than  $\frac{1}{4}$  of an inch. (See Figure II). It was considered, therefore, that these members were "knife edges", providing line, rigid support.

## 2. STRESSCOAT TESTS

Stresscoat tests were made for informative reasons, to determine the appearance of the tensile and compressive strain fields under loading. (A typical Stresscoat pattern for a 3" x 2 3/8" x 2.0# aluminum I-beam is illustrated in Figures VI and VII). The load position and length of span were varied in some of these test runs. Since Stresscoat reacts both to tensile loading, and to compressive loading under certain conditions, some runs were made for each of these two types of loads. The compression load strain patterns were compared with the tensile strain patterns. No effort was made to match observed and calibrated strains. In the cases where strain patterns were matched wide divergence of results was noted. It is not known whether this divergence was due to inability of the authors to correctly match strains or to variation in the sensitivity of the beam patterns and those on the calibration strips. To obtain greatly enlarged areas of strain patterns, the beam surfaces were cooled suddenly





by means of blasts of compressed gaseous carbon dioxide expanding against the metal surfaces. This cooling process has great advantage in a qualitative testing. Greatly increased strain sensitivity of Stresscoat at low temperatures allows a much more complete strain picture, providing the aid of the overall pattern of the entire specimen wherever strains are present. In the test runs of this thesis, for instance, cooling the web surfaces provides strain patterns on the compression side of the neutral axis of the beam. No attempt was made to determine the lacquer sensitivity under the "cooled" conditions.

### 3. STRAIN GAGE TESTS

The method of loading applied to obtain data for computation of shear stress is described in paragraph B (1), above. Readings of each strain gage's resistance were taken by means of the SK-1 Strain Indicator (See Figure VIII) at each load in each test run. That is, for each run a load was applied and the strain readings were taken; the load was increased and readings were again taken; and so on. The readings taken at approximately 500 pounds load were used as check readings since it was found that readings for zero load could not be compared with any accuracy.





FIGURE I. Location of Strain Gages H-1, H-2, H-3 and H-4 on Bottom of Lower Flange. Note Gages D-1 and D-2 on Under Side of Upper Flange.





FIGURE II. (a) Location of Strain Gauges (Rows, F, F, and G) on Flange Web, and Single Strain Gages (Rows A, E, and C) on Top of Upper Flange.











RECTANGULAR STRAIN  
ROSETTE NOMOGRAPH

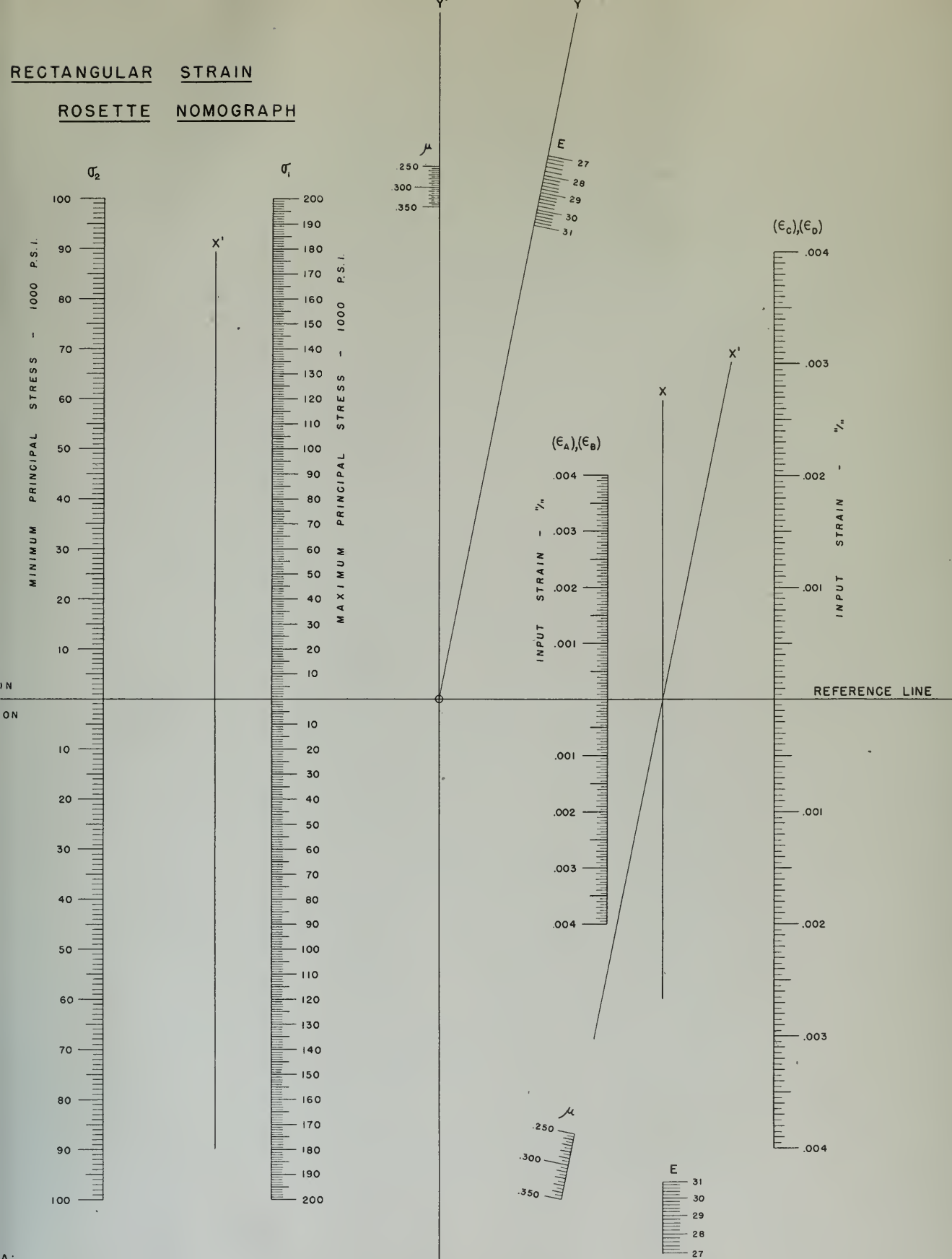


Figure III. Sample Nomograph used for solution of Shear Stress from Strain Gage Data.



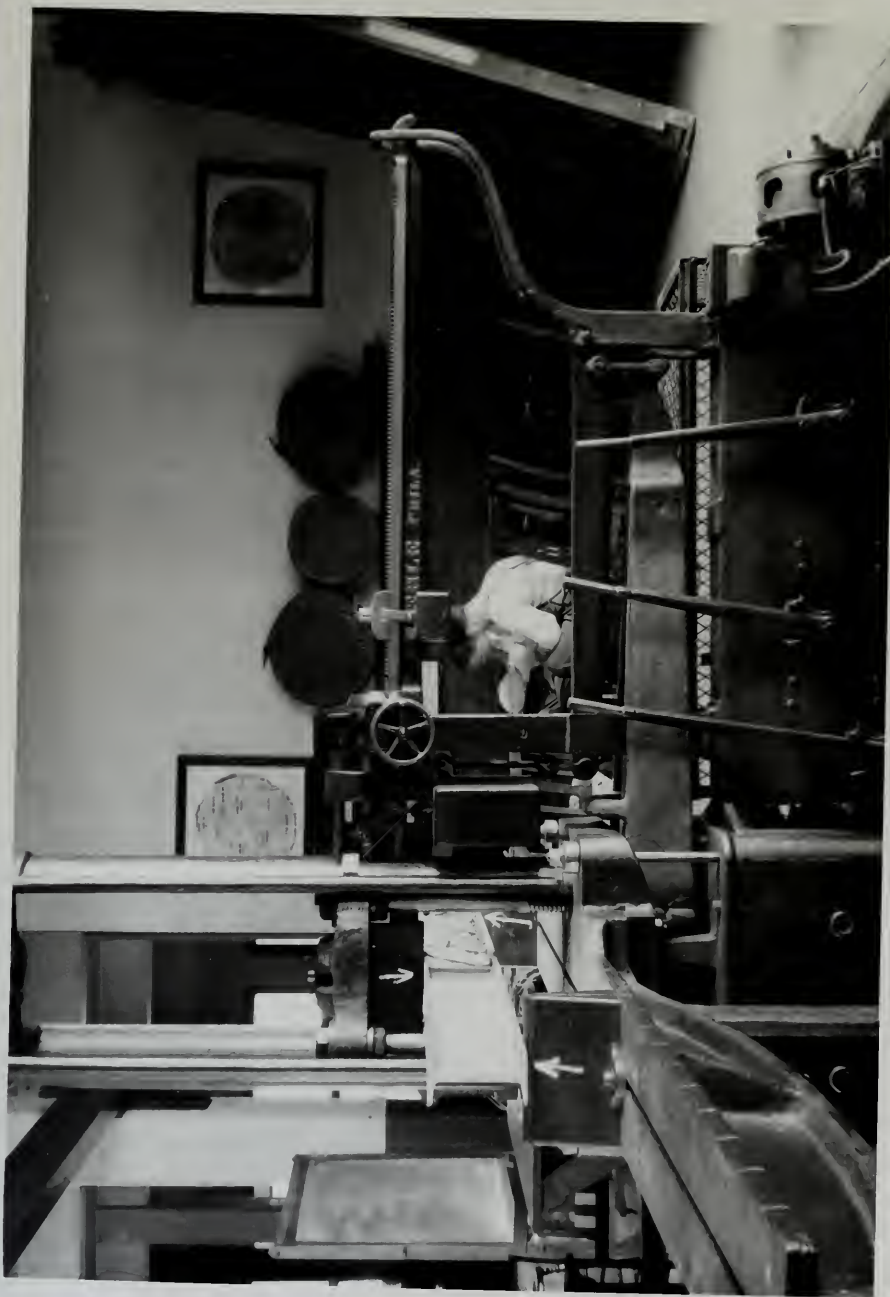


FIGURE IV. Richle Universal Testing Machine with Beam in Position for Loading. Arrows Show Locations of Supports and Loading Wedge.





FIGURE V. General View of Test Arrangement.





Support 5 feet      Load Position      Support 2 feet

←      ↓      →

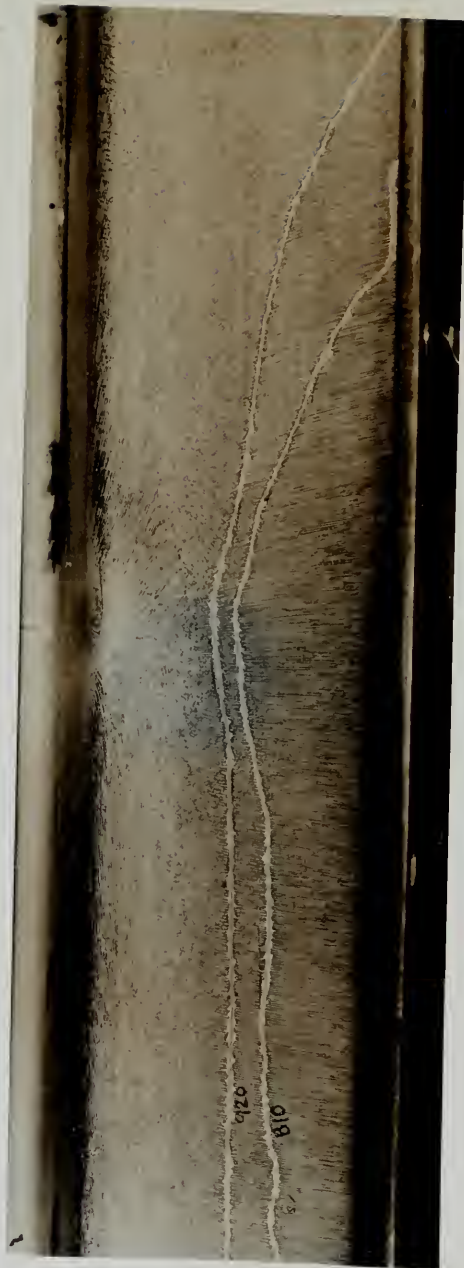


FIGURE VI. Typical Stresscoat Crack Pattern.  
 Beam shown is 3" x 2 3/8" Aluminum I-Beam.  
 Heavy scratch lines indicate extent of crack  
 pattern for the load noted. Remainder of  
 crack pattern obtained by use of CO<sub>2</sub> to cool  
 web surface.





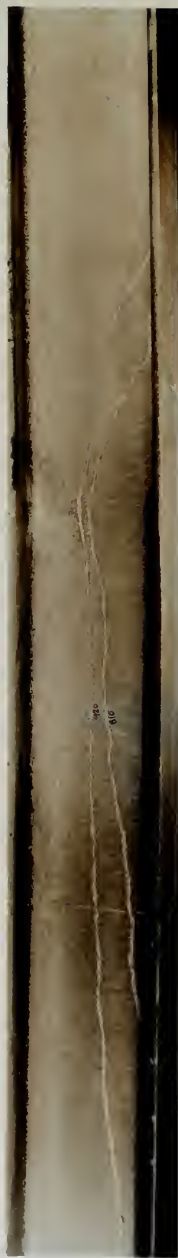


FIGURE VII. 3" Aluminum Beam with Typical cross-hatched Grain Pattern. This is same beam as in fig. VI, but a greater length of beam is shown.



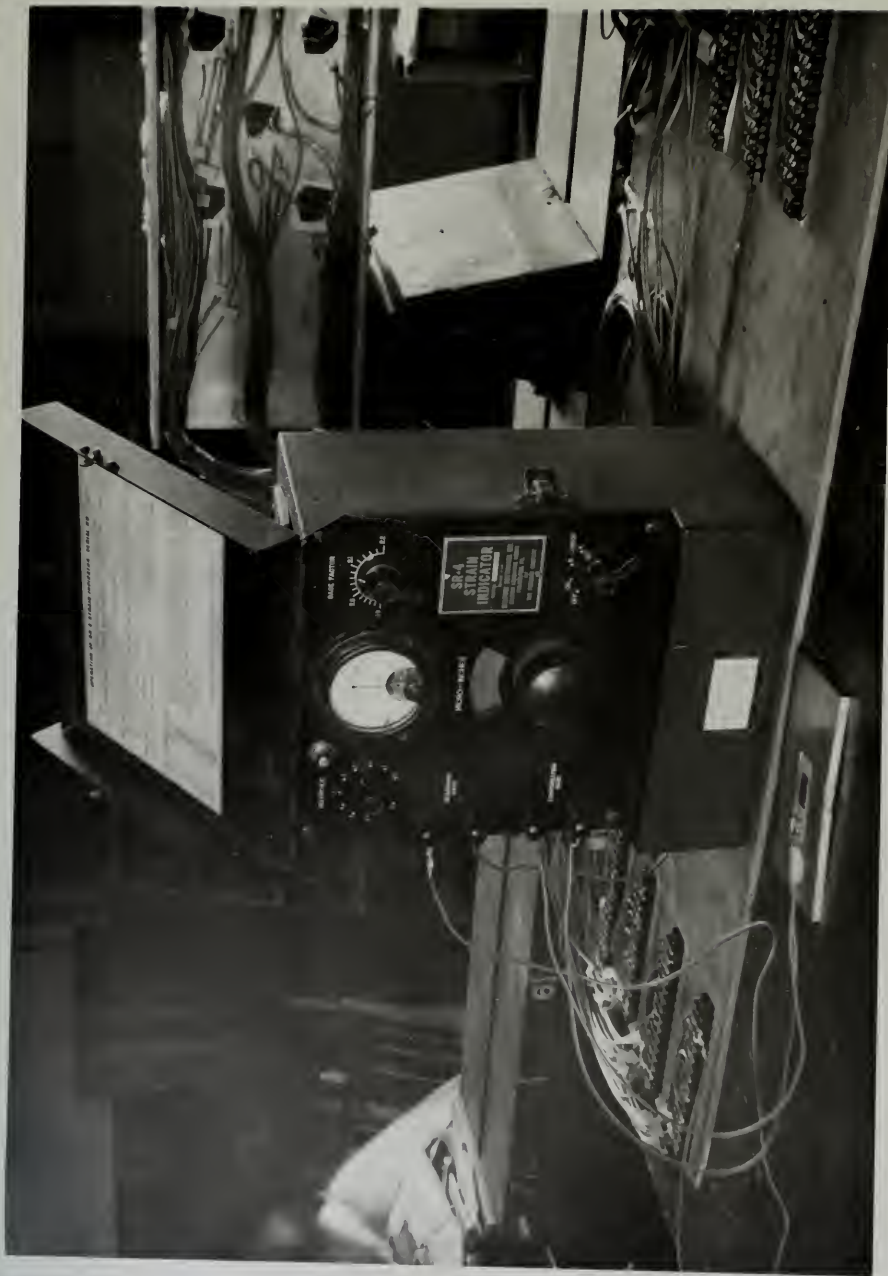


FIGURE VIII. Baldwin Southwark SR-4 Strain Indicator used in Bear Tests. Compensating Gage shown in foreground. Note connector strips beside indicator. Binding posts were used to assure positive connection by cruching lead to indicator against lead to individual Gages.



APPENDIX B  
TABLES OF RESULTS





MAGNITUDE OF  
MAXIMUM SHEAR STRESS  
IN 8" I BEAM  
RUN # 1

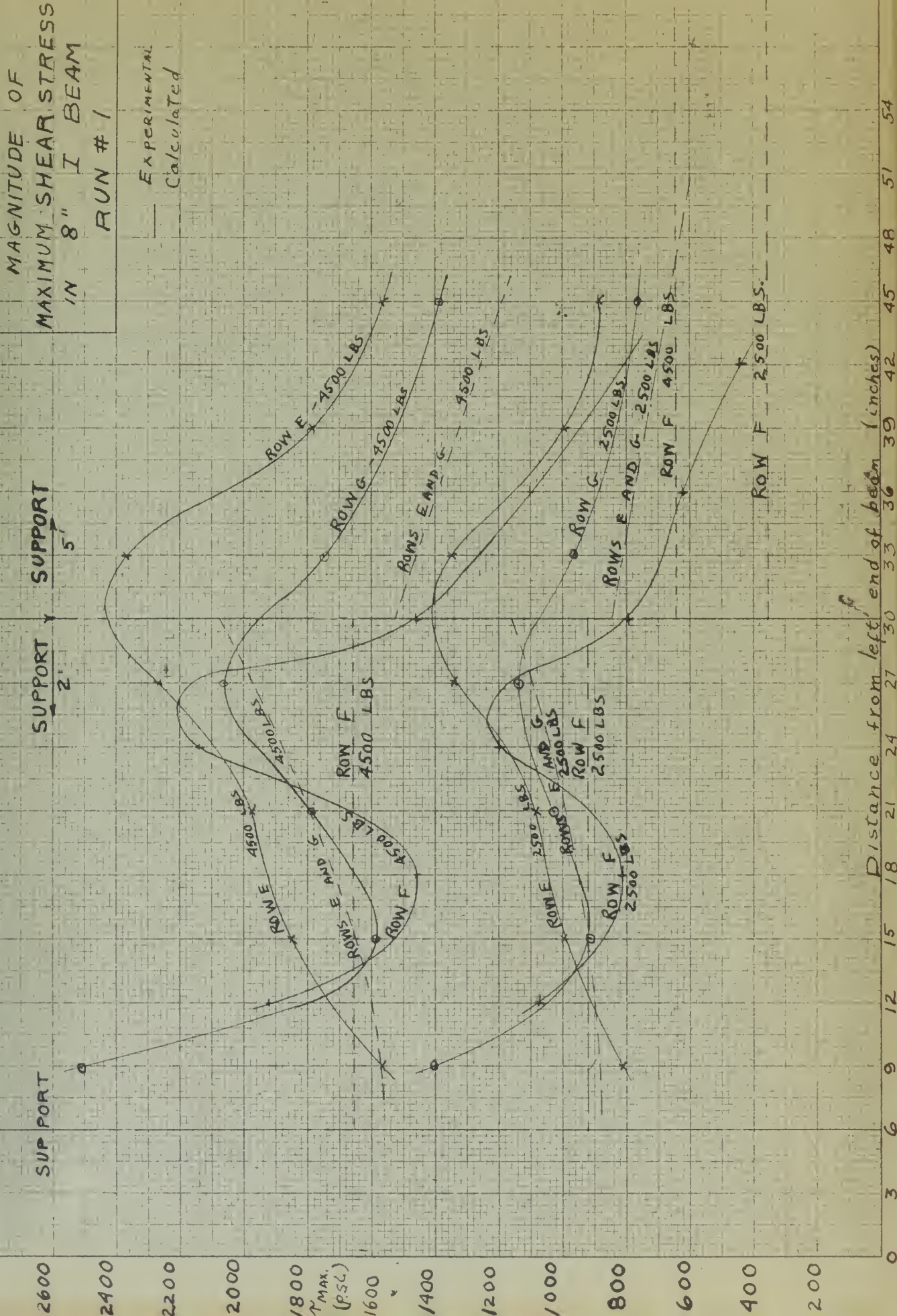
EXPERIMENTAL  
Calculated

LOAD

SUPPORT 2' SUPPORT 5'

SUP PORT

2600  
2400  
2200  
2000  
1800  
1600  
1400  
1200  
1000  
800  
600  
400  
200



Distance from left end of beam (inches)

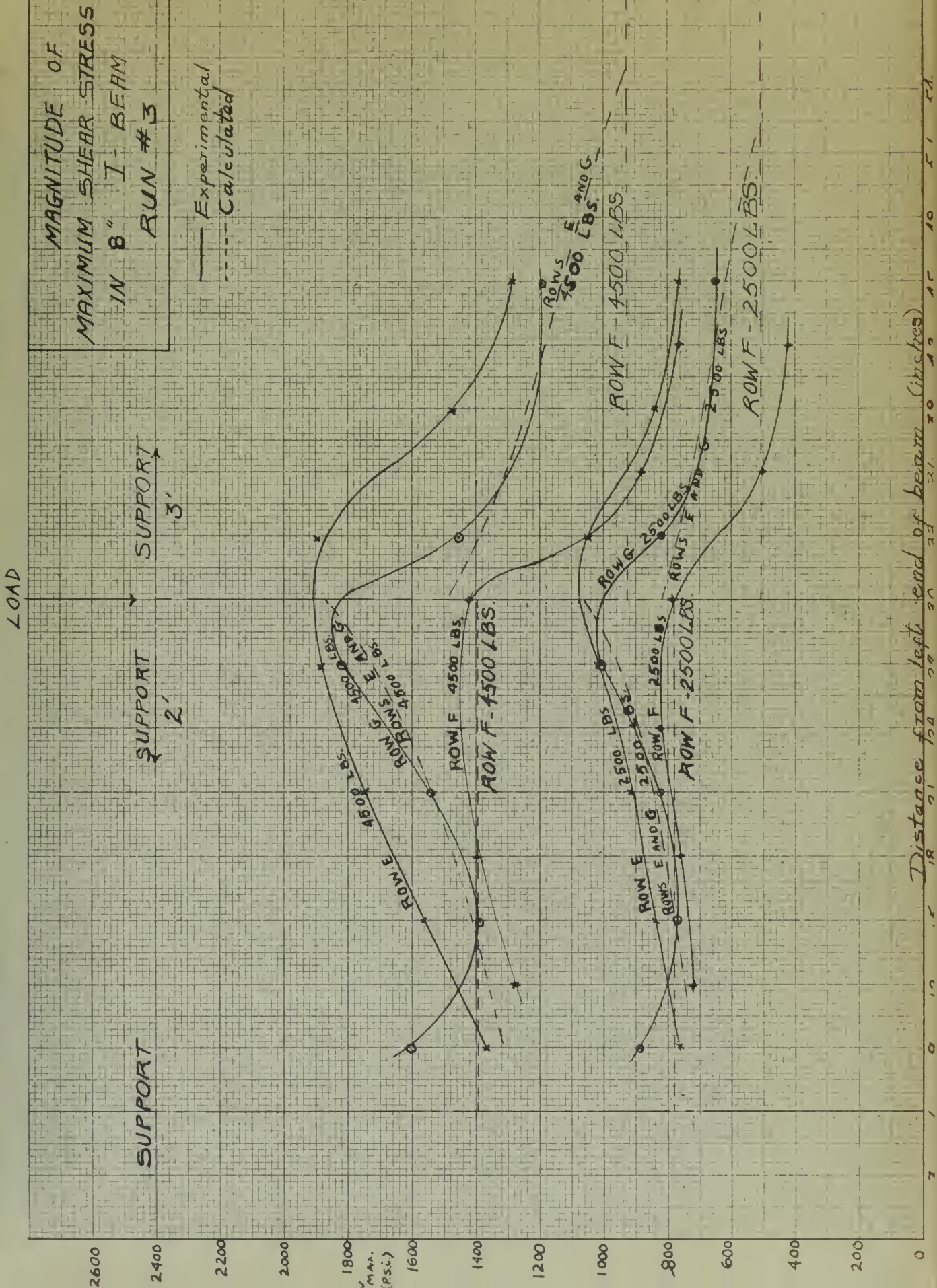
0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54





# MAGNITUDE OF MAXIMUM SHEAR STRESS IN 8" I-BEAM RUN #3

— Experimental  
- - - - - Calculated



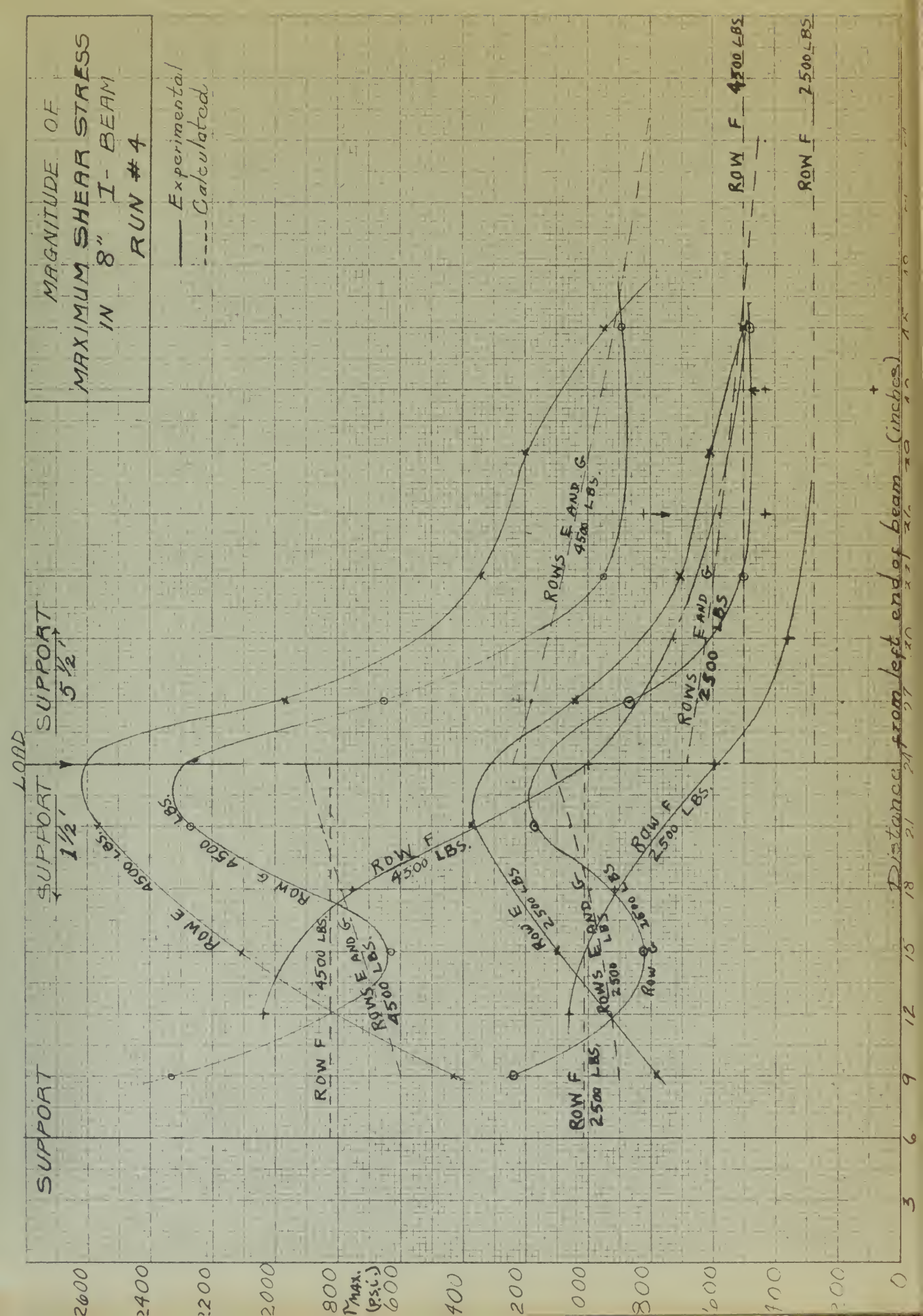
Distance from left end of beam (inches)





MAGNITUDE OF  
MAXIMUM SHEAR STRESS  
IN 8" I-BEAM  
RUN #4

— Experimental  
- - - Calculated



Distance from left end of beam (inches)





MAGNITUDE OF  
MAXIMUM SHEAR STRESS  
IN 8" I-BEAM  
RUN #6

— Experimental  
----- Calculated

SUPPORT

SUPPORT 1 1/2' 2 1/2'

SUPPORT

Distance from left end of beam (inches)

3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48 51 54

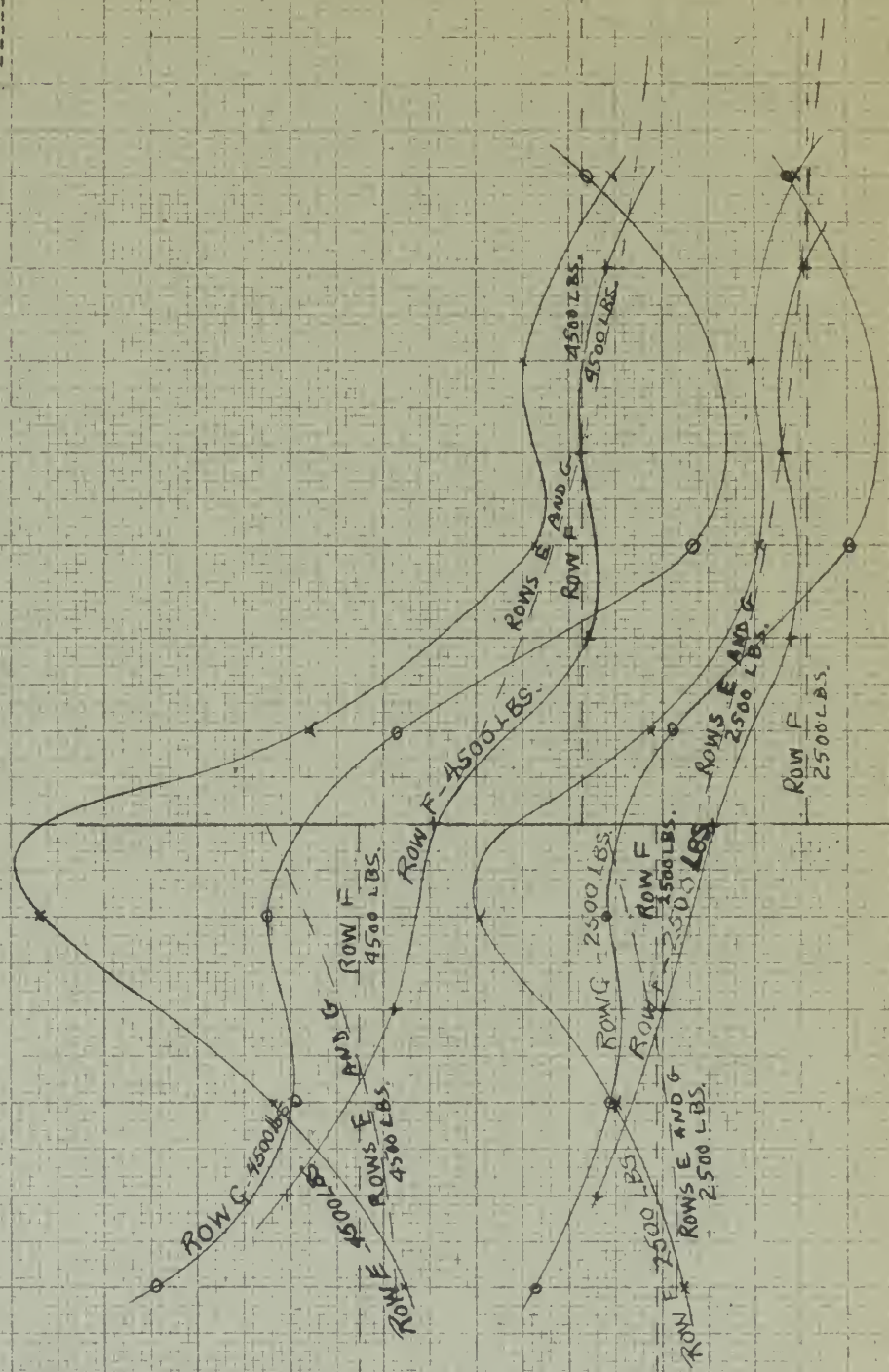




TABLE 1.  
CALCULATED STRAIN GAGE DATA

Run Number: 1

17 August 1946

Beam Span 7 feet

Load Position 2 feet from near support

Load 2500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_4$	$\epsilon_5$	$\epsilon_6$	$\bar{\epsilon}_m$	$\phi$
E-1	-18	-112	-23	-18	-113	-23	-816	44
E-2	3	-135	-67	4	-137	-67	-1000	35 $\frac{1}{2}$
E-3	1	-152	-73	2	-154	-73	-1080	34 $\frac{1}{2}$
E-4	-17	-212	-187	-13	-212	-187	-1342	25 $\frac{1}{2}$
E-5	175	-21	-176	119	-20	-178	-1350	17 $\frac{1}{2}$
E-6	34	0	-146	37	+2	-147	988	-15 $\frac{3}{4}$
E-7	18	12	-123	31	14	-123	-882	
F-1	-11	-126	-8	-11	-131	-8	1078	45
F-2	-123	1	0	-123	3	-2	810	24 $\frac{1}{2}$
F-3	-28	-138	15	-28	-140	16	-1200	-40 $\frac{1}{2}$
F-4	-142	-98	+21	-142	-97	24	-794	-12 $\frac{1}{2}$
F-5	-29	41	-26	-28	43	-25	620	45 $\frac{1}{2}$
F-6	-16	32	-11	-18	35	-11	446	43 $\frac{1}{2}$
G-1	-12	-159	0	-12	-162	0	-1400	-44
G-2	-27	-81	45	-28	-83	46	904	-34 $\frac{1}{2}$
G-3	-38	-88	65	-39	-91	66	-1034	-32
G-4	-66	-64	115	-68	-66	116	-1136	-22 $\frac{1}{2}$
G-5	-62	86	100	-64	87	101	960	20
G-6	115		-42	116		-44		
G-7	-50	66	92	-52	66	93	760	16 $\frac{1}{2}$





TABLE II.  
CALCULATED STRAIN GAGE DATA

Run Number: 1

17 August, 1946

Beam Span 7 feet

Load Position 2 feet from near support

Load 3500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$
E-1	-25	-159	-32	-24	-161	-31
E-2	5	-188	-93	7	-190	-93
E-3	2	-213	-103	4	-215	-103
E-4	-22	-297	-261	-17	-297	-261
E-5	160	-29	-248	165	-28	-251
E-6	51	0	-202	55	3	-203
E-7	25	17	-173	29	20	-174
F-1	-15	-180	-11	-15	-183	-11
F-2	-172	1	0	-172	4	3
F-3	-40	-191	24	-40	-195	25
F-4	-200	-136	+29	-201	-135	53
F-5	-36	59	-56	-37	62	-55
F-6	-25	50	-14	-25	52	-13
G-1	-15	-223	0	-15	-228	0
G-2	-38	-114	63	-39	-117	64
G-3	-56	-121	90	-58	-124	91
G-4	-90	-88	161	-93	-92	163
G-5	-85	120	138	-86	121	140
G-6	160		-60	161		-63
G-7	-69	94	129	-72	95	130



TABLE III.  
CALCULATED STRAIN GAGE DATA

Run Number: 1

17 August 1946

Beam Span 7 feet

Load Position 2 feet from near support

Load 4500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\tau_m$	$\phi$
E-1	-82	-204	-43	-31	-236	-42	1566	-44 1/8
E-2	6	-243	-121	8	-246	-121	1850	-35 1/8
E-3	3	-273	-133	6	-275	-133	1978	33 3/8
E-4	-30	-382	-357	-23	-383	-336	2272	26
E-5	207	-37	-314	214	-36	-318	2376	-13 1/8
E-6	64	0	-259	70	4	-260	1786	-19 1/8
E-7	31	21	-220	36	25	-221	1564	-21 1/8
F-1	-20	-232	-13	-20	-236	-13	1920	-44 1/8
F-2	-222	2	0	-222	3	4	1986	23
F-3	-51	-249	29	-52	-254	30	2140	-40 1/8
F-4	-258	-176	37	-259	-175	42	1460	-13 3/8
F-5	-49	74	-46	-48	77	-45	1100	44 1/8
F-6	-32	83	-21	-32	65	-20	814	42 5/8
G-1	-23	-286	0	-23	-292	0	2510	-44
G-2	-49	-145	82	-51	-147	83	1588	-74
G-3	-68	-157	117	-66	-156	118	1784	-51 1/8
G-4	-118	-115	206	-122	-119	211	2062	-21 1/8
G-5	-112	133	179	-116	155	181	1742	19 1/8
G-6	205		-73	207		-83		
G-7	-89	116	168	-93	116	168	1384	16



TABLE IV.  
CALCULATED STRAIN GAGE DATA

Run Number: 1

17 August 1946

Beam Span 7 feet

Load Position 2 feet from near support

	<u>Load(Pounds)</u>		
	2500	3500	4500
A-1	-115	-163	-207
A-2	-396	-533	-604
A-3	-254	-358	-458
B-1	9	12	15
B-2	-25	-35	-47
B-3	19	26	35
B-4	-113	-159	-203
B-5	45	63	80
B-6	-68	-138	-203
B-7	62	88	111
B-8	-203	-284	-368
B-9	218	305	397
B-10	-249	-343	-442
B-11	73	102	132
B-12	-254	-356	-459
B-13	-168	-258	-345
C-1	-36	-50	-65
C-2	-226	-315	-398
C-3	-404	-554	-724
C-4	-173	-241	-308
D-1	-26	-37	-47
D-2	-135	-190	-245
H-1	54	78	101
H-2	91	128	166
H-3	148	207	266
H-4	372	382	491
H-5	295	391	514
H-6	372	382	491
H-7	214	301	385



TABLE V.  
CALCULATED STRAIN GAGE DATA

Run Number: 3

19 August 1946

Beam Span 5 feet

Load Position 2 feet near support

Load 2500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\tau_m$	$\phi$
E-1	-57	-134	-50	-56	-132	-49	-770	-40
E-2	-19	-135	-70	-18	-133	-81	-840	35
E-3	0	-133	-81	0	-136	-81	-940	$33\frac{1}{2}$
E-4	-47	-202	-164	-44	-188	-163	-1006	$28\frac{3}{4}$
E-5	-7	-7	-169	-3	-3	-169	1060	-23
E-6	0	-13	-139	3	-10	-139	834	-20
E-7	0	0	-108	2	2	-108	694	-22
F-1	-17	-139	-70	-16	-137	-70	-870	$36\frac{3}{4}$
F-2	-149	-30	-29	-148	-26	-26	-760	$22\frac{1}{2}$
F-3	-29	-136	-60	-28	-134	-59	-858	$40\frac{1}{2}$
F-4	-131	-90	25	-132	-88	28	-786	-12
F-5	-20	26	-37	-19	27.5	-37	500	-40
F-6	-26	25	-15	-26	26	-14	420	$41\frac{1}{2}$
G-1	-17	-121	-27	-16	-120	-27	-802	$43\frac{1}{2}$
G-2	-16	-101	-18	-16	-100	-18	-748	$44\frac{1}{2}$
G-3	-53	-101	20	-53	-100	21	-832	$-32\frac{3}{4}$
G-4	-84	-96	68	-35	-36	70	-1016	-25
G-5	-74	50	75	-78	50	77	820	$16\frac{1}{2}$
G-6	50		-101	52		-102		
G-7	-45	53	20	-45	54	21	654	32





TABLE VI.  
CALCULATED STRAIN GAGE DATA

Run Number: 3

19 August 1946

Beam Span 5 feet

Load Position 2 feet from near support

Load 3500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$
E-1	-81	-188	-69	-80	-185	-67
E-2	-32	-217	-129	-29	-214	-128
E-3	-0	-168	-115			
E-4	-67	-284	-231	-62	-278	-230
E-5	-0	-9	-238	-4	-4	-238
E-6	0	-18	-194	4	-14	-194
E-7	0	0	-151	3	3	-151
F-1	-24	-194	-99	-22	-192	-99
F-2	-208	-42	-41	-207	-37	-37
F-3	-42	-188	-85	-40	-185	-84
F-4	-185	-126	35	-186	-123	39
F-5	-20	35	-50	-27	154	-49
F-6	-38	35	-20	-38	36	-19
G-1	-23	-169	-38	-22	-168	-38
G-2	-23	-141	-24	-23	-140	-24
G-3	-75	-144	26	-76	-143	28
G-4	-116	-134	95	-118	-134	97
G-5	-104	66	105	-106	66	107
G-6	70		-142	73		-143
G-7	-65	73	30	-66	74	31



TABLE VII.  
CALCULATED STRAIN GAGE DATA

Run Number: 3

19 August 1946

Beam Span 5 feet

Load Position 2 feet from near support

Load 4500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$T_m$	$\phi$
E-1	-104	-242	-89	-102	-243	-87	-1370	-40
E-2	-38	-279	-130	-56	-281	-129	-1560	35
E-3	0	-240	-148	3	-242	-143	-1640	33 $\frac{1}{2}$
E-4	-83	-366	-297	-77	-365	-295	-1876	29 $\frac{1}{2}$
E-5	-11	-15	-305	-5	-8	-305	1890	-22
E-6	0	-24	-249	5	-19	-249	1466	-20
E-7	0	0	-193	4	4	-133	1274	-22 $\frac{1}{2}$
F-1	-32	-251	-127	-29	-253	-126	-1610	-37
F-2	-270	-55	-53	-269	-50	-48	1386	22 $\frac{1}{2}$
F-3	-55	-239	-110	-53	-241	-109	-1442	40
F-4	-237	-163	43	-238	-162	48	-1420	-12 $\frac{1}{2}$
F-5	-36	46	-67	-35	49	-66	880	-40 $\frac{1}{2}$
F-6	-49	45	-27	-48	48	-26	770	41 $\frac{1}{2}$
G-1	-30	-217	-49	-29	-219	-46	-1600	43 $\frac{1}{2}$
G-2	-30	-182	-30	-29	-184	-29	-1380	45
G-3	-95	-185	34	-96	-187	36	-1520	-53 $\frac{1}{2}$
G-4	-150	-173	122	-153	-175	125	-1816	-25
G-5	-134	86	132	-137	88	135	1454	17
G-6	90		-133	94		-185		
G-7	-80	95	37	-81	98	39	1190	32



TABLE VIII.  
CALCULATED STRAIN GAGE DATA

Run Number: 3

19 August 1946

Beam Span 5 feet

Load Position 2 feet from near support

	<u>Load (pounds)</u>		
	2500	3500	4500
A-1	-118	-166	-215
A-2	-182	-256	-329
A-3	-230	-322	-414
B-1	-29	-89	-50
B-2	-38	-95	-122
B-3	-25	-35	-45
B-4	-129	-180	-231
B-5	-4	-6	-9
B-6	-169	-235	-304
B-7	11	16	20
B-8	-214	-301	-389
B-9	91	126	164
B-10	-236	-331	-426
B-11	11	16	20
B-12	-227	-319	-410
B-13	-194	-274	-352
C-1	-75	-106	-136
C-2	-216	-290	-364
C-3	-214	-301	-389
C-4	-156	-217	-280
D-1	-72	-102	-131
D-2	-183	-257	-330
H-1	0	0	0
H-2	44	61	79
H-3	82	114	147
H-4	183	257	330
H-5	210	294	380
H-6	144	200	257
H-7	87	121	155



TABLE IX.  
CALCULATED STRAIN GAGE DATA

Run Number: 4

23 August 1946

Beam Span 7 feet

Load Position  $1\frac{1}{2}$  feet from near support

Load 2500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_4$	$\epsilon_5$	$\epsilon_6$	$\tau_m$	$\phi$
E-1	-35	-117	-27	-34	-116	-26	-780	$-43\frac{1}{2}$
E-2	-5	-153	-55	-4	-152	-55	-1100	39
E-3	0	-217	-176	4	-213	-176	-1380	27
E-4	14	-32	-185	18	-29	-185	1038	$-13\frac{1}{2}$
E-5	23	-9	-113	25	-7	-113	702	$-13\frac{1}{2}$
E-6	22	-2	-94	25	1	-94	612	$-15\frac{1}{2}$
E-7	10	0	-76	12	1	-76	500	$-18\frac{1}{2}$
F-1	-10	-134	-19	-10	-133	-19	-1064	43
F-2	-142	0	-14	-142	3	-11	918	26
F-3	-134	-78	-15	-134	-75	-2	-596	$-2\frac{1}{2}$
F-4	0	20	-32	1	21	-32	360	$-32\frac{1}{2}$
F-5	-29	21	-28	-28	22	-27	432	45
F-6	-4	7	0	-4	7	0	91	$39\frac{1}{2}$
G-1	-25	-147	6	-23	-147	6	-1240	$-41\frac{1}{2}$
G-2	-14	-58	65	-14	-59	63	-822	$-32\frac{1}{2}$
G-3	-51	-114	62	-52	-114	63	-1176	-32
G-4	-80	45	96	-82	45	97	868	11
G-5	-31	43	69	-32	42	70	500	12
G-6	85		-31	86		-33		
G-7	-21	52	70	-22	51	70	482	$15\frac{1}{2}$





**TABLE X.**  
CALCULATED STRAIN GAGE DATA

Run Number: 4

23 August 1946

Beam Span 7 feet      Load Position  $1\frac{1}{2}$  feet from near support

Load 3500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$
E-1	-52	-169	-40	-51	-167	-39
E-2	-7	-221	-79	-5	-219	-79
E-3	0	-315	-254	5	-310	-254
E-4	20	-47	-239	25	-113	-269
E-5	32	-14	-163	33	-11	-164
E-6	31	-2	-136	34	0	-157
E-7	15	0	-110	17	2	-110
F-1	-16	-193	-27	-15	-126	-27
F-2	-205	0	-18	-205	4	-14
F-3	-194	-114	-22	-194	-110	-18
F-4	0	27	-47	1	28	-47
F-5	-42	30	-40	-41	32	-39
F-6	-5	9	0	-5	9	0
G-1	-35	-214	8	-35	-215	8
G-2	-20	-83	95	-22	-85	95
G-3	-71	-167	89	-76	-167	90
G-4	-115	66	139	-118	66	141
G-5	-44	03	36	-46	62	39
G-6	123		-44	124		-47
G-7	-30	73	100	-32	71	101



TABLE XI.  
CALCULATED STRAIN GAGE DATA

Run Number: 4

23 August 1946

Beam Span 7 feet

Load Position  $1\frac{1}{2}$  feet from near support

Load 4500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$T_m$	$\phi$
E-1	-68	-223	-62	-67	-221	-51	-1436	46 $\frac{1}{2}$
E-2	-8	-289	-105	-6	-287	-103	2114	39
E-3	0	-410	-381	7	-403	-331	2572	27 $\frac{1}{2}$
E-4	27	-63	-350	34	-55	-351	-1978	14 $\frac{1}{2}$
E-5	40	-18	-214	45	-13	-215	1338	14 $\frac{1}{2}$
E-6	41	-3	-179	45	0	-180	1196	15 $\frac{1}{2}$
E-7	20	0	-144	23	3	-144	956	18 $\frac{1}{2}$
F-1	-19	-252	-36	-13	-251	-38	2040	45 $\frac{1}{2}$
F-2	-269	0	-25	-266	6	-20	1766	25 $\frac{1}{2}$
F-3	-253	-147	-29	-252	-143	-26	1000	1 $\frac{1}{2}$
F-4	0	38	-60	41	40	-60	964	-33
F-5	-55	40	-52	-54	42	-51	826	44 $\frac{1}{2}$
F-6	-6	12	0	-6	12	0	1186	38
G-1	-44	-277	9	-44	-276	10	2338	42
G-2	-27	-110	124	-29	-112	125	1630	32 $\frac{1}{2}$
G-3	-95	-216	119	-97	-216	121	2270	32 $\frac{1}{2}$
G-4	-150	89	181	-154	88	184	1650	11 $\frac{1}{2}$
G-5	-58	82	129	-61	80	130	958	12 $\frac{1}{2}$
G-6	162		-55	163		-58		
G-7	-37	98	131	-40	96	132	896	15 $\frac{1}{4}$



TABLE XII.  
CALCULATED STRAIN GAGE DATA

Run Number: 4

23 August 1946

Beam Span 7 feet

Load Position  $1\frac{1}{2}$  feet from near support

	<u>Load (pounds)</u>		
	2500	3500	4500
A-1	-123	-171	-229
A-2	-178	-257	-338
A-3	-184	-265	-347
B-1	-25	-37	-49
B-2	-29	-43	-56
B-3	21	20	38
B-4	-124	-179	-234
B-5	38	55	70
B-6	-153	-228	-301
B-7	120	187	247
B-8	-188	-273	-357
B-9	38	59	90
B-10	-181	-262	-345
B-11	47	65	86
B-12	-172	-249	-329
B-13	-162	-233	-304
C-1	-40	-58	-75
C-2	-151	-219	-286
C-3	-188	-273	-356
C-4	-160	-231	-302
D-1	-33	-53	-70
D-2	-165	-239	-314
H-1	49	72	94
H-2	100	145	190
H-3	186	269	352
H-4	208	300	393
H-5	189	274	358
H-6	155	226	298
H-7	146	212	277



**TABLE XIII.**  
**CALCULATED STRAIN GAGE DATA**

Run Number: 6

26 August 1946

Beam Span 4 feet

Load Position  $1\frac{1}{2}$  feet from near support

Load 2500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\tau_m$	$\phi$
E-1	-18	-97	-11	-18	-98	-11	-780	45 $\frac{3}{4}$
E-2	13	-113	-51	14	-114	-51	900	35 $\frac{1}{2}$
E-3	7	-135	-100	9	-136	-100	1200	32 $\frac{7}{8}$
E-4	0	23	-107	2	25	-102	-324	27 $\frac{1}{2}$
E-5	18	25	-68	19	27	-68	-592	24 $\frac{1}{2}$
E-6	20	39	-54	21	41	-54	-614	28
E-7	8	44	-27	9	45	-27	-512	35 $\frac{3}{8}$
F-1	-4	-113	-17	-4	-115	-17	944	42 $\frac{3}{4}$
F-2	-117	1	-18	-117	4	-16	800	61 $\frac{1}{2}$
F-3	-108	-60	39	-103	-80	41	-670	-8 $\frac{1}{2}$
F-4	0	49	-14	0	50	-14	-574	40 $\frac{1}{4}$
F-5	0	57	-4	0	58	-4	-540	43 $\frac{1}{2}$
F-6	0	54	-1	0	55	-1	-498	44 $\frac{1}{2}$
G-1	-23	-135	0	-23	-128	0	-1078	47 $\frac{1}{2}$
G-2	-11	-60	50	-12	-87	30	-902	50 $\frac{1}{2}$
G-3	-42	-70	67	-43	-72	68	-920	61 $\frac{1}{2}$
G-4	-55	37	74	-57	68	75	780	69 $\frac{1}{2}$
G-5	-16	45	65	-17	46	33	599	62 $\frac{1}{2}$
G-6	-12		40	-13		42		
G-7	-16	56	19	-16	57	19	324	53 $\frac{1}{2}$





TABLE XIV.  
CALCULATED STRAIN GAGE DATA

Run Number: 6

26 August 1948

Beam Span 4 feet

Load Position  $1\frac{1}{2}$  feet from near support

Load 3500 pounds

	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$
E-1	-25	135	-17	-25	139	-17
E-2	18	-158	-71	19	-160	-71
E-3	11	-226	-141	14	-228	-141
E-4	0	41	-140	-3	45	-140
E-5	26	35	-93	28	37	-94
E-6	28	55	-75	30	58	-76
E-7	12	61	-38	13	63	-38
F-1	-6	-158	-23	-6	-161	-23
F-2	-151	2	-26	-150	3	-25
F-3	-152	-85	55	-153	-89	54
F-4	0	69	-21	0	70	-21
F-5	0	79	-6	0	81	-6
F-6	0	77	-2	0	79	-2
G-1	-31	-174	0	-31	-177	1
G-2	-15	-118	+42	-16	-121	42
G-3	-57	-37	94	-59	-101	95
G-4	-74	93	104	-76	95	102
G-5	-22	62	45	-23	62	44
G-6	-18		58	-19		57
G-7	-22	78	27	-22	80	27



TABLE XV.  
CALCULATED STRAIN GAGE DATA

Run Number:6

26 August 1946

Beam Span 4 feet

Load Position  $1\frac{1}{2}$  feet from near support

Load 4500 pounds

	$\epsilon_1'$	$\epsilon_2'$	$\epsilon_3'$	$\epsilon_1$	$\epsilon_2$	$\epsilon_3$	$\tau_m$	$\phi$
E-1	-27	-174	-24	27	-176	-23	-1358	45 $\frac{1}{2}$
E-2	23	-203	-92	25	-206	-92	-1638	55 $\frac{1}{2}$
E-3	20	-290	-180	24	-293	-180	-2146	-31 $\frac{1}{2}$
E-4	0	51	-162	4	56	-162	-1560	28 $\frac{1}{2}$
E-5	35	45	-120	38	48	-121	-1076	23 $\frac{1}{2}$
E-6	35	70	-87	37	72	-98	-1100	28 $\frac{1}{2}$
E-7	15	79	-53	16	82	-50	-902	35
F-1	-7	-193	-29	-6	-201	-31	1610	43 $\frac{1}{2}$
F-2	-202	2	-33	-207	7	-29	1370	62 $\frac{1}{2}$
F-3	-193	-138	71	-197	-102	75	-1286	80 $\frac{1}{2}$
F-4	0	89	-26	1	92	-26	-958	41
F-5	0	101	-9	0	103	-9	-976	32 $\frac{1}{2}$
F-6	0	96	-2	0	100	-2	-920	44 $\frac{1}{2}$
G-1	-41	-224	1	-41	-227	2	-1890	47 $\frac{1}{2}$
G-2	-20	-152	50	-21	-154	53	-1584	51
G-3	-73	-125	122	-75	-129	123	-1646	61
G-4	-93	118	180	-96	119	137	1362	69 $\frac{1}{2}$
G-5	-29	81	+59	-28	85	60	728	61 $\frac{1}{2}$
G-6	-25		-75	-23		-74		
G-7	-30	101	33	-31	103	34	962	53 $\frac{1}{2}$



TABLE XVI.  
CALCULATED STRAIN GAGE DATA

Run Number: 6

26 August 1946

Beam Span 4 feet

Load Position  $1\frac{1}{2}$  feet from near support

	<u>Load (pounds)</u>		
	2500	3500	4500
A-1	-88	-125	-108
A-2	-43	-100	-255
A-3	-98	-138	-178
B-1	0	0	0
B-2	-21	-29	-37
B-3	25	54	43
B-4	-87	-125	-100
B-5	37	52	67
B-6	-113	-165	-213
B-7	107	150	192
B-8	-133	-105	-252
B-9	53	48	61
B-10	-125	-177	-228
B-11	26	37	43
B-12	-91	-127	-106
B-13	-57	-79	-101
C-1	-18	-26	-35
C-2	-115	-159	-203
C-3	-130	-180	-231
C-4	-47	-66	-85
D-1	-24	-32	-44
D-2	-154	-216	-277
H-1	53	73	95
H-2	80	114	146
H-3	154	216	279
H-4	169	234	302
H-5	123	172	222
H-6	79	112	145
H-7	44	62	80



TABLE XVII.





TABLE XVIII.

THE QUANTAL CHLOR. ANAL. DATA

Run Name: 2		Total Resolution of Column: 9																		
Vertical Resolution Line: 1 inch between lines.																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A																				
B																				
C																				
D																				
E		20	27	40																
F																				
G	41 $\frac{1}{2}$	42 $\frac{1}{2}$	44 $\frac{1}{2}$	46	52															
H																				
I	46	48	52 $\frac{1}{2}$	56	60 $\frac{1}{2}$	72	84	100	112 $\frac{1}{2}$	117	118									
J																				
K	54 $\frac{1}{2}$	58	61	67	74	82 $\frac{1}{2}$	85	95 $\frac{1}{2}$	100	104 $\frac{1}{2}$	108									
L																				
M	61	62 $\frac{1}{2}$	67	71	75 $\frac{1}{2}$	82 $\frac{1}{2}$	89 $\frac{1}{2}$	99	100	101 $\frac{1}{2}$	103	108	108	108	108	108	108	108	108	108



TABLE XIX.  
STRESSCOAT CRACK ANGLE DATA

Run Number: 3		Load Position at Column 10															
Vertical Reference Line Spacing 1 inch Between Lines.																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A					15	13	11½	13			175	175					
B																	
C				16	16½	18	19	19			175	176	178				177½
D																	
E				24½	23½	22½	23½	26			172½	174	175½	172			170½
F																	
G				41	39	36	38½	44	51½	59	142½	146	144	143			143
H																	
I			55	54½	54	58½	60½	65½	72½	75	88	95½	98	101	100	99½	99
J																	
K		59½	58½	62	66	72½	76	78½	80	82	91	96½	99	97½	97½	100	101½
L																	
M	66½	70	70	74	78½	80	80	80	81½	88	92	95	94	94	98	95½	95



TABLE XIX. (cont'd.)  
STRESSCOAT CRACK ANGLE DATA

Run Number: 3                      Load Position at Column 13

Vertical Reference Line Spacing 1 inch Between Lines.

18    19    20    21    22    23    24

A						
B						
C	176	174	175			
D						
E	174	175	172			
F						
G	142	143	144			
H						
I	98	98	99½	100	101	
J						
K	98½	100	103	96½	100	101
L						
M	94	95	95½	93½	94	95
						98½



Run number: 3

Run Date: 11/11/1963

Vertical distance from baseline to first band: 10.0 cm.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A				12	3	6	9	10	10	9	9	10	10	10	10	10	10
B			17	11	8	9	9	9	9	9	11	10	10	10	10	10	8
C		17	12	11	10	10	9	8	9	11	13	11	10	9	9	9	10
D		18	16	14	14	12	11	9	11	9	10	12	11	10	11	10	12
E		30	25	23	21	20	18	15	14	14	15	15	13	14	14	14	11
F		37	33	28	29	22	32	29	21	19	17	16	15	14	14	14	12
G	38	35	33	37	37	39	36	34	35	32	32	36	35	32	32	29	28
H	45	47	50	52	52	57	55	62	66	65	65	69	68	68	68	71	67
I	54	60	60	61	60	63	67	69	73	74	75	78	73	73	73	75	71
J	61	61	65	67	70	71	72	73	75	76	77	76	75	75	75	75	76
K	63	63	74	76	78	79	77	79	80	80	77	78	78	78	78	77	76
L	73	77	77	77	79	79	80	79	79	79	78	78	78	79	79	78	77
M	76	79	81	71	72	82	83	82	83	83	80	82	83	71	80	80	82

NOTE: Short end of band is to the right.





TABLE XX. (contd.)  
SOUTH OF ST. ARCTIC 1914

Run Number: 5

Local Position: 16 Column 23

Vertical Reference Line Spacing 1 inch Between Lines.

16	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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TABLE XXI.  
CHASSAUNT MOUNTAIN DATA

Run Number: 8

Lead Position: at Column 10

Vertical Reference Line Spacing: 1 inch Between Lines.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A	98	99½	99½	100	97½	97	101	111	144	17	45	66	71	78	75	70	34	72
B	97½	105	104	105	100	99	108	110	141	12	42½	60	67	82	80	67	68	74
C	101	105½	102½	106	108	104	109	114	148	12½	39	50	57½	63	61½	61½	63	65½
D	107	108	104½	107	107	107	114	117		12	37	58	55	56	61	58	59	71½
E	111	105	107½	108	105½	105½	104	136		12	33	46	50	51½	57	54	56½	55
F	115	114	116½	122	125½	125½	127	135	0	9	21	45	40½	45½	47	51	53½	54
G	117	120½	125½	128½	128½	132½	136	145	0	13	30	39	43	42½	41	44	50	50
H	135	135	131½	126	116	132½	132½	163½	0	11	10	30	39	50	45½	45	45	
I	138	136½	140½	142½	142½	142½	169	169	0	11	10	39	26	32	31	43½	41	
J	137	143	143½	147	147	162	164½	164½	0	5	14	19½	21	27½	33	35	31½	
K	155½	155½	156½	156½	160	165½	169	169	0	2	14	19½	21½	27	33	35	33	
L	158	154	154	160	170	173	173	173	0	4	9	16	16½	20½	23½	23½	23½	
M		162	166½	171	172	172	172	172	0	4	12	16	15	16	16	16	16	

NOTE: Short end of beam is to right.



TABLE XXII.  
STRESS-COAT CRACK ANGLE DATA

Run Number: 9		Load Position at Column 10.2															
Vertical Reference Line Spacing 1 inch Between Lines.																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
A							1	15					153½	164	162	153	
B					0½		0	13	48½				150½	162	158½	155½	
C				10½	5	3	2	14	30	99			151½	159	164	155	154
D			17	13	7	6	6	14	54	107	122	125	154	155	149½		
E			21	19	19	9	10	16½	56	115	123	142	149	146	143		
F	32	27½	27	27	23	21½	22½	28	79	117½	126	134½	145	141½			
G	41	41½	32½	32½	34	36	32½	53½	90	117	123½	133	152	141½			
H	53½	50½	50½	49½	47½	42½	58	76	79	108	117	127	155	154½			
I	63½	66	66	58	63	65	70½	79	90	101	113	124	125	152½			
J	68	66½	66½	66	69½	74	77	81	85	101	109	116	119½	123			
K 78	76½	72½	72½	74	74	82	83	83½	85	99½	108	112½	116	115			
L 74½	77	77½	77½	77	80	84	85½	83½	84	93½	106	109	113½	115			
M 80	80	78	77½	77½	82½	85½	86½	85	86	90½	106½	109½	109½	113	112		



APPENDIX C.STRESS CALCULATION

Part I. Computation of Shear Stress from Strain Gage Readings.

Calculation for Run No. 3, 10 August 1948, Page 8-8

Load - 2500 pounds.

from three readings:

$$\epsilon_1' = 20$$

$$\epsilon_2' = 1.8$$

$$\epsilon_3' = -57$$

$$\begin{aligned} \text{Then: } \epsilon_1 &= \epsilon_1' - \mu \epsilon_3' \\ \epsilon_2 &= 1.78 - \mu (\epsilon_1' + \epsilon_3') \\ \epsilon_3 &= \epsilon_3' - \mu \epsilon_1' \end{aligned}$$

For mild steel,  $\mu = .0013$

Therefore,

$$\epsilon_1 = 20 - (.0013)(-57)$$

$$\epsilon_1 = 20 + 0.75$$

$$\epsilon_1 = 20.75$$

$$\epsilon_2 = (1.78)(23) - (.0013)(-57)$$

$$\epsilon_2 = 40.5 + 1.72$$

$$\epsilon_2 = 42.2$$

$$\epsilon_3 = -57 - (.0013)(20)$$

$$\epsilon_3 = -57 + .43$$

$$\epsilon_3 = -56.57$$

From Nomograph Solution for Shear Stress

$$\tau_m = -500 \text{ lbs./sq.in}$$

$$\phi = -40^\circ$$





Part II. Computation of Shear Stress from Simple Beam Formulas:

For Run No. 3, 12 August 1946, Position F-5

$$W = 2500 \text{ lbs.}$$

$$A = 2 \text{ ft.}$$

$$B = 3 \text{ ft.}$$

$$L = 5 \text{ ft.}$$

$$V = -\frac{WA}{L}$$

$$V = -1000 \text{ lbs.}$$

$$Q = 8.04 \text{ in.}^3 \text{ (obtained by integrating tracing of beam cross-section)}$$

$$I = 35.6 \text{ in.}^4 \text{ (obtained as above)}$$

$$b = .28 \text{ in. (from direct meas.)}$$

$$\begin{aligned} \tau_{31} &= \frac{VQ}{Ib} \\ &= \frac{(-1000)(8.04)}{(35.6)(.28)} \end{aligned}$$

$$\tau_{31} = -516 \text{ lbs./sq.in.}$$

$$\begin{aligned} M &= \frac{WA}{L} (L-X) \\ &= \frac{(2500)(2)}{5} \quad (5-2.25) \\ &= (2500)(2)(2.75) \end{aligned}$$

$$M = 2750 \text{ Ft. lbs.}$$

$$C = 0$$

$$\sigma_3 = 0$$

$$\sigma_1 = 0 \text{ (assumed)}$$

$$\begin{aligned} \tau_m &= \pm \sqrt{\left(\frac{\sigma_3 - \sigma_1}{2}\right)^2 + \tau_{31}^2} \\ &= \pm \sqrt{0 + (516)^2} \end{aligned}$$

$$\tau_m = \pm 516 \text{ lbs./sq.in.}$$



b. For Run No. 1, 17 August 1946, Gage Position E-2

$$W = 4500 \text{ lbs.}$$

$$A = 2 \text{ ft}$$

$$B = 5 \text{ ft}$$

$$L = 7 \text{ ft}$$

$$C = 2 \text{ in.}$$

$$b = .28 \text{ in.}$$

By integration of section

$$Q = 7.54 \text{ in.}^3$$

$$V = \frac{WB}{L}$$

$$= \frac{(4500)(5)}{7}$$

$$V = 3210 \text{ lbs./sq.in.}$$

$$\tau_s = \frac{VQ}{Ib}$$

$$= \frac{(3210)(7.54)}{(55.4)(.28)}$$

$$= 1557 \text{ lbs./sq.in.}$$

$$M = \frac{WBX}{L}$$

$$= \frac{(4500)(5)(.75)}{7}$$

$$M = 2410 \text{ ft. lbs.}$$

$$\sigma_s = \frac{Mc}{I}$$

$$= \frac{(2410)(2)(12)}{55.3}$$

$$\sigma_s = 1040 \text{ lbs./sq.in.}$$

$$\sigma_t = 0 \text{ (assumed)}$$

$$\tau_m = \pm \sqrt{\frac{(1040)^2}{2} + (1557)^2}$$

$$\tau_m = \pm 1543 \text{ lbs./sq.in.}$$



## APPENDIX D

### OBSERVED DATA

#### DESCRIPTION OF DATA:

##### STRESSCOAT DATA

This data is presented as loading data and crack angle data. The loading data provides information on type of load, position of load, etc., for each test run. The crack angle data summarizes the angles of the individual Stresscoat cracks. These angles were measured from the horizontal in a counter clockwise direction from the right. These data provide information which would enable any person to reconstruct the tensile strain pattern for each load listed. The method of obtaining this crack angle data was as follows:

1. After completion of the test run and application of  $\text{CO}_2$ , the beam was removed from the testing machine and a rectangular reference grid system marked off covering the area of the crack pattern. The reference lines were run parallel to the assumed neutral axis and at right angles to the assumed neutral axis. The columns (numbered 1, 2, 3, etc.) represent lines drawn perpendicular to the neutral axis, and lines (lettered A, B, C, etc.) represent lines parallel to the neutral axis.
2. The angle of cracking was then measured at each intersection of the grid reference lines.
3. Explanation of labelling of reference lines.



- a. Low numbers are to the left, looking towards the beam, in all cases.
  - b. Unless otherwise stated, the short span is to the left.
  - c. Longitudinal reference lines are spaced  $\frac{1}{2}$  inch between lines; vertical reference lines are spaced as noted on each data sheet.
4. The position of the beam neutral axis is on reference line G.

#### STRAIN GAGE DATA

Data is presented for each test load of each run made, in the sequence of loading. From this observed data the observed values were faired, and the faired data used to obtain values of strain for calculation of results. The strain indicator reference position value was omitted from these tables of observed data, since all data under each reading are based on the same reference position. The values given in the columns under each load are expressed in micro-inches per inch.





Bar Number 1

Date: 1 Jul, 1960

Bar - par 7 feet

Size of test hole:

100mm 1008

Load Data:

Sensitivity .0006 in/in

Compression (or Tension)

Load Position 14 feet from rear support

loading time (sec.)	Bar load (lbs.)	Pressure Load (lbs.)	Time Interval (sec.)	Cycle Time (sec.)	Remarks (Crack locations)
40	3500	3500	175	245	None
75	3000	3000	200	300	None
175	4550	4550	140	340	None
170	5520	5520	120	420	Top of Bottom Flange and Bottom of Web Beneath Load
207	5910	5910	375	590	Increased "Crack" Area



# TABLE XXIV

DATA

Run Number:

Date: 10 JUL 1965

Equipment: Load

Location: 10 ft

Load Data:

Number: 1000

(Compression (or Tension))

Sensitivity:

Load Position: 10 ft from support

Loading Time (sec.)	Scale Load (lbs.)	Effective Load (lbs.)	Time Underload (sec.)	Cycle Time (sec.)	Remarks (Crack Locations)
42	5000	5000	61	175	None
10	4060	4060	68	75	Top of bottom flange above near support
61	5000	5000	65	132	No increase
152	6010	6010	101	253	Bottom of bottom flange beneath load
195	6970	6970	115	320	Increased Crack Areas



Bar Number 3

Beam Span 7 feet

Load Data:

Compressive (or Tension)

Load Position 2 feet from rear support

Date: 10 July 1946

Stresscoat Data:

Number 1-08

Conductivity .00074 in/in

Loading Time (Sec.)	Beam Load (lbs.)	Effective Load (lbs.)	Time Underload (Sec.)	Cycle Time (Sec.)	Remarks (Sketch Locations)
100	2900	2900	125	220	Top of two plates are below of bottom plate at a load of 2900 lbs., begin load off center
132	3500	3500	160	392	Increased area on top of top plate has circle area on top of bottom plate
160	4940	4940	147	285	New area at bottom of web between increased circle areas
210	5570	5570	312	598	Increased circle areas



TABLE XXVI

STRESS AND LOADING DATA

Date: 10 July 1946

Structural plate:  
Number 1008

Run Number 4

Beam Span 7 feet

Load data:

Compression (or Tension)

Load Position 18 feet from rear support

Loading Time (Sec.)	Scale Load (lbs.)	Effective Load (lbs.)	Time Water-Loaded (Sec.)	Cycle Time (Sec.)	Remarks (Other Loadings)
					(Initial Load 5520 pounds)
35	3340	1000	95	130	None
22	2350	940	125	137	None
72	1810	2710	145	220	None
65	940	4560	130	195	None
70	80	5400	75	145	None





# TABLE XXVII

## STRESSCOAT LOADING DATA

Run Number 5

Date: 22 July 1946

Beam Span 7 feet

Stresscoat Date:

Load Date:

Number 1420

Tension Load

Sensitivity .00083 in/in

Load Position 2 1/2 feet from near support

Loading Time (Sec.)	Scale Load (lbs.)	Effective Load (lbs.)	Time Underload (Sec.)	Cycle Time (Sec.)	Remarks (Crack Locations)
77	2870	2870	91	187	None
86	3080	3080	98	171	Top of bottom flange beneath load. Bottom of bottom flange beneath load.
90	4420	4450	150	217	Increased areas as above
108	5030	5040	214	329	Increased areas as above. Bottom of web beneath load.
107	5440	5440	113	230	Increased areas as above
168	5320	5320	314	463	Increased areas as above



TABLE x x VIII

SHEAR-SOFT LOADING TEST

Run Number 6

Beam Span 7 Feet

Load Rate:

Compression (or Tension)

Load Position 3 Feet from Left Support

Date: 22 July 1958

Strain Gage Data:

Run 17 1958

Sensitivity .0010 in/in

Loading Time (Sec.)	Scale Load (lbs.)	Effective Load (lbs.)	Time Underload (Sec.)	Cycle Time (Sec.)	Remarks
75	2960	2900	81	164	None
78	3470	3470	38	121	None
82	3970	3970	158	228	Top and bottom of bottom flange beyond load
90	4345	4245	170	270	Increased stress in above. Area of bottom 3 feet length load.
125	4870	4530	173	308	Increased stress in above
160	5410	5410	248	439	Increased stress in above



Date: Dec 10, 1940  
Experiment No.:  
Number 103

Run No. 7  
Time 1:17.7 sec  
Load Data:  
Compression (or Tension)  
Load Position 7 feet from rear support

Loading Time (Sec.)	Load (Lbs.)	Effective Load (Lbs.)	Time Under Load (Sec.)	Cycle Time (Sec.)	Remarks (Circumstances)
	810	810		270	None
	860	860		430	Top and bottom of section separated.
	810	810		710	Increment of load 53 lbs. Noted - C. was 14 in. at 400.
	820	820		690	Increment of load 10 lbs.

Note: This beam was 3" x 2 3/8" I section.



# TABLE XXX

COAL MINE

Coal Mine

Run 9 feet

Notes:

Coal Mine (No. 100)

Coal Mine (No. 100) (No. 100)

Date: 27 July 1944

Coal Mine (No. 100)

Coal Mine (No. 100)

Coal Mine (No. 100)

Notes:  
(Coal Mine)

Cycle  
Time  
(Sec.)

Time  
Under  
(Sec.)

Exclusive  
Time  
(Sec.)

Code  
Data  
(Sec.)

Time  
(Sec.)

None  
175  
None

None  
245  
None

None  
307  
None

None  
335  
None

Upper 100 filler under 1000.  
Total to 1100

Intermediate areas as above  
400

75

108

82

125

231

95

0

200

0

225

0

270

0

310

0

350

0

410

4700

4710

4670

4550

4770

2000

4670

1480

4780

1120

4710

570

50

55

58

55

48

172





TABLE XXXI  
STRESSCOAT LOADING DATA

Run Number 9		Date: 23 July 1948			
Beam Span 6 feet		Stresscoat Data:			
Load Data:		Number			
Tension Load		Sensitivity		in/in	
Load Position 2 feet from near support					
Loading Time (Sec.)	Scale Load (lbs.)	Effective Load (lbs.)	Time Underload (Sec.)	Cycle Time (Sec.)	Remarks (Crack Locations)
32	3270	3270	105	202	None
35	3370	3370	129	168	None
15	4560	4560	55	75	Top of bottom flange at near support
100	5260	5260	45	155	Increased areas as above
65	5950	5950	55	125	Increased areas as above
90	6410	6410	100	240	Increased area as above. Bottom of web beneath load.



TABLE XXXII

STRAIN GAGE READING NUMBERS vs. STRAIN GAGE NUMBERS

Reading Number	Gage Number	Reading Number	Gage Number	Reading Number	Gage Number
1	B-5	31	F-6-3	60	G-5-3
2	B-6	32	F-6-2	67	C-5-2
3	C-2	33	F-6-1	68	G-5-1
4	B-7	34	F-5-3	69	H-5
5	A-2	35	F-5-2	70	G-4-3
6	B-8	36	F-5-1	73	G-4-2
7	B-9	37	F-4-3	74	G-4-1
8	E-10	38	F-4-2	75	H-4
9	C-3	39	F-4-1	76	G-3-3
10	B-11	40	F-3-3	77	G-3-2
11	A-3	41	F-3-2	78	C-3-1
12	B-12	42	F-3-1	79	H-3
13	B-13	43	F-5-1	80	G-2-3
14	C-4	44	F-5-3	81	G-2-2
15	E-2-3	45	F-4-3	82	C-2-1
16	E-2-2	46	F-4-2	83	H-2
17	E-2-1	47	F-4-1	84	G-1-3
18	E-1-3	48	F-3-3	87	G-1-1
19	E-1-2	49	F-3-2	88	G-1-0
20	E-1-1	50	F-3-1	89	H-1
21	D-1	51	F-2-3	90	F-6-1
22	D-2	52	F-2-2	91	F-6-2
23	B-1	53	F-2-1	92	F-6-3
24	B-2	54	F-1-1	93	G-7-1
25	C-1	55	F-5-2	94	G-7-2
26	B-3	56	H-7	95	G-7-3
27	A-1	58	G-6-3	96	F-7-1
28	B-4	64	G-6-1	97	F-7-2
29	F-1-3	65	H-6	98	E-7-3
30	F-1-2				



TABLE XXXII)

STRAIN GAGE CONSTANTS

Gage Number	Gage Factor	Auxiliary Factor	Calibrated Res. (ohms)
A-1	2.04		119.6
A-2	2.09		120.0
A-3	2.09		120.0
B-1	2.04		119.6
B-2	2.04		119.6
B-3	2.04		119.6
B-4	2.04		119.6
B-5	2.04		119.6
B-6	2.04		119.6
B-7	2.04		119.6
B-8	2.09		120.0
B-9	2.09		120.0
B-10	2.09		120.0
B-11	2.09		120.0
B-12	2.09		120.0
B-13	2.09		120.0
C-1	2.04		119.6
C-2	2.04		119.6
C-3	2.09		120.0
D-1	2.09		120.0
D-2	2.09		120.0
E-1	2.07	.0200	120.1
E-2	2.07	.0200	120.1
E-3	2.07	.0200	119.9
E-4	2.07	.0200	119.9
E-5	2.07	.0213	120.3
E-6	2.07	.0213	120.1
E-7	2.07	.0213	120.1
F-1	2.07	.0200	120.1
F-2	2.07	.0200	119.9
F-3	2.07	.0200	119.9
F-4	2.07	.0213	120.3
F-5	2.07	.0213	120.3
F-6	2.07	.0213	120.1
G-1	2.07	.0200	120.1
G-2	2.07	.0200	120.1
G-3	2.07	.0200	119.9
G-4	2.07	.0213	120.3
G-5	2.07	.0213	120.3
G-6	2.07	.0213	120.1
G-7	2.07	.0213	120.1
H-1	2.09		120.0
H-2	2.09		120.0
H-3	2.09		120.0
H-4	2.09		120.0
H-5	2.09		120.0
H-6	2.09		120.0
H-7	2.09		120.0



**TABLE XXXIV**  
OBSERVED STRAIN GAGE DATA

Run Number: 1

Date: 17 August 1948

Beam Span 7 feet

Load Position 2 Feet From near support

Reading Number	Load (pounds)			
	500	2530	3520	4450
1	1003	1050	1060	1085
2	1217	1001	1009	922
3	899	771	682	599
4	1133	1185	1209	1263
5	842	680	545	218
6	1154	972	881	678
7	1172	1365	1420	1552
8	1291	1109	983	679
9	258	115	942	622
10	390	449	480	550
11	529	337	221	018
12	1104	902	760	600
13	1239	1088	989	853
14	890	750	680	590
15	1067	1011	968	900
16	440	330	271	225
17	102	110	110	118
18	822	909	890	788
19	629	533	499	440
20	450	430	420	418
21	285	260	250	231
22	735	629	570	517
23	150	158	158	163
24	519	482	485	481
25	1032	1009	990	980
26	539	559	563	578
27	285	185	141	097
28	1012	921	878	840
29	909	909	900	898
30	394	283	240	193
31	570	459	388	292
32	890	890	890	880
33	290	315	340	379
34	1040	890	778	530
35	399	432	479	423
36	606	631	697	760
37	529	381	302	138
38	720	547	473	348
39	585	582	616	670
40	169	103	008	062
41	948	831	773	720
42	600	621	627	652
43	332	521	532	542
44	677	647	651	639
45	402	422	452	472





TABLE XXXIV (CONT.)  
OBSERVED STRAIN GAGE DATA

Run Number: 1

Date: 17 August 1948

Beam Span 7 feet

Load Position 2 feet from near support

Reading Number	Load (pounds)			
	500	2530	3520	4460
46	888	815	771	712
47	918	300	751	689
48	599	380	332	395
49	500	479	427	373
50	720	702	707	711
51	800	720	790	798
52	470	450	470	480
53	828	716	670	620
54	139	121	120	120
55	663	693	722	760
61	605	779	873	1020
63	295	244	223	220
64	032	112	173	311
65	894	1088	1230	1490
66	535	613	609	873
67	708	753	792	900
68	1140	1086	1040	871
69	619	367	1102	1703
70	710	796	888	1062
73	269	200	171	170
74	979	911	900	842
75	681	1104	1273	1708
76	1337	1452	1462	1510
77	684	610	570	547
78	1075	1038	1050	1033
79	871	490	580	673
80	626	643	667	697
81	281	200	186	150
82	700	671	662	673
83	382	456	491	540
84	274	297	276	293
87	743	701	698	710
88	1459	1340	1274	1205
89	1450	1431	1533	1543
90	810	797	799	783
91	732	821	834	850
92	761	763	780	757
93	920	883	865	860
94	512	362	387	430
95	253	323	367	445
96	922	939	950	990
97	271	266	272	290
98	553	453	406	360



**TABLE XXXV**  
OBSERVED STRAIN GAGE DATA

Run Number: 2

Date: 19 August 1946

Beam Span 6 feet

Load Position 2 feet from near support

Reading Number	Load (pounds)				
	500	2512	3435	4450	510
1	1230	1219	1260	1200	1190
2	1391	1251	1193	1139	1075
3	1019	853	800	740	1000
4	1353	1372	1471	1428	1333
5	951	713	730	585	920
6	1330	1170	1115	1010	1340
7	582	660	740	772	570
8	1269	1072	1009	902	1240
9	392	199	143	012	350
10	623	659	708	720	612
11	710	520	445	358	705
12	500	300	245	143	480
13	1390	1221	1170	1088	1372
14	881	710	670	590	878
15	1265	1189	1189	1158	1237
16	620	499	454	411	611
17	1230	1219	1242	1323	1222
18	1015	967	989	989	991
19	792	699	670	623	790
20	610	580	600	581	605
21	479	422	430	410	451
22	1148	1003	955	901	1133
23	1370	1328	1359	1340	1340
24	712	668	695	660	699
25	1181	1129	1139	1110	1151
26	714	719	748	740	698
27	1380	1288	1275	1219	1372
28	1160	1068	1042	1003	1161
29	1152	1124	1140	1122	1159
30	613	480	438	398	598
31	630	542	521	457	642
32	975	960	990	965	961
33	1310	1348	1340	1340	1310
34	969	852	790	700	940
35	520	520	525	501	518
36	842	781	813	815	825
37	1550	1402	1353	1273	1449
38	810	610	547	468	792
39	798	730	739	740	768
40	697	613	539	540	677
41	1180	1002	965	910	1125
42	837	812	880	833	812
43	628	650	654	662	688
44	880	868	821	810	829
45	606	629	641	623	579



TABLE XXXV (CONT.)  
OBSERVED STRAIN GAGE DATA

Run Number: 2

Date: 17 August 1948

Beam Span 6 feet

Load Position 2 feet from near support

Reading Number	Load (pounds)				
	500	2515	5425	4480	510
46	965	890	872	851	951
47	991	859	820	770	978
48	796	700	670	660	680
49	820	730	659	590	798
50	917	882	886	879	909
51	1080	1082	1057	1050	1045
52	798	707	690	669	670
53	967	920	852	802	980
54	1278	1220	1305	1239	1388
55	819	855	870	880	820
61	960	1140	1143	1243	962
63	1335	1229	1276	1251	1300
64	1247	1325	1359	1371	1304
65	1477	1640	1732	1603	1452
66	1550	1642	1655	1678	1539
67	785	819	823	842	772
68	1200	1172	1120	1097	1180
69	705	930	1040	1144	718
70	1017	1166	1177	1216	1024
73	1308	1387	1317	1301	1372
74	1066	1073	1031	1000	1000
75	576	783	852	950	550
76	693	763	797	770	656
77	685	846	773	743	652
78	1273	1270	1221	1212	1250
79	1704	1352	1902	1970	1692
80	1718	1768	1779	1737	1711
81	1443	1406	1385	1306	1424
82	872	889	900	840	844
83	1563	1626	1652	1676	1617
84	1410	1421	1410	1401	1404
87	943	959	935	909	932
88	780	827	852	870	750
89	736	879	842	802	780
90	898	918	903	910	900
91	930	988	965	930	850
92	850	820	793	800	732
93	1030	1000	983	970	1010
94	1333	1315	1410	1442	1317
95	1370	1460	1480	1513	1362
96	1060	1103	1100	1115	1082
97	458	442	435	441	402
98	700	663	583	553	690





TABLE xxvi  
OBSERVED STRAIN GAGE DATA

Run Number: 3

Date: 19 August 1946

Beam Span 5 feet

Load Position 2 feet from near support

Reading Number	Load (pounds)				
	480	2480	3510	4535	515
1	1155	1150	1150	1152	1152
2	1349	1200	1129	1060	1266
3	1010	945	749	661	905
4	374	354	360	362	253
5	878	891	623	539	727
6	1349	1151	1055	973	1240
7	523	612	649	676	459
8	1228	1045	939	841	1125
9	1326	1132	1066	970	1227
10	572	592	585	590	490
11	660	489	378	230	568
12	488	295	212	118	380
13	1366	1206	1131	1062	1252
14	896	739	680	613	812
15	1221	1138	1038	1064	1119
16	503	431	396	332	498
17	1212	1160	1150	1141	1108
18	671	910	860	870	868
19	788	649	595	540	672
20	588	518	391	480	482
21	1380	1298	1279	1238	1264
22	1130	988	901	836	1033
23	1398	1262	1212	1239	1210
24	1661	1497	1522	1552	1540
25	1132	1066	1040	1009	1029
26	698	649	641	630	576
27	405	270	232	180	295
28	1119	1006	935	909	1320
29	1149	1053	1044	1012	1029
30	1509	1377	1331	1261	1420
31	612	501	440	389	529
32	972	920	922	912	861
33	1333	1260	1293	1291	1231
34	903	766	700	630	811
35	1471	1409	1403	1401	1361
36	870	789	787	785	759
37	566	394	335	260	440
38	778	591	509	427	689
39	778	730	712	693	699
40	650	549	525	480	572
41	1145	980	910	860	103
42	836	779	770	772	730
43	682	631	613	619	599
44	839	752	740	723	720
45	580	539	552	559	472





**TABLE ~~XXXVI~~ (cont)**  
OBSERVED STRAIN GAGE DATA

Rur. Number: 3

Date: 10 August 1946

Beam Span 5 feet

Load position 2 feet from near support

Reading Number	Load (pounds)				
	490	2460	3510	4535	515
46	950	847	811	775	851
47	1002	850	773	720	852
48	689	602	501	580	668
49	749	639	583	532	680
50	810	830	820	802	792
51	1058	883	952	936	822
52	680	605	598	500	563
53	881	831	770	705	802
54	1255	1131	1151	1130	1160
55	850	801	819	820	708
61	922	990	1030	1060	840
63	500	300	270	232	252
64	1212	1205	1222	1246	1300
65	1435	1510	1370	1218	1325
66	612	655	685	712	580
67	812	800	312	835	751
68	1182	1081	1042	1015	1090
69	707	824	912	908	890
70	1018	1030	1058	1032	900
72	1340	1256	1220	1180	1242
74	1072	982	930	892	960
75	532	640	720	752	413
76	640	630	642	648	533
77	853	720	690	632	738
78	1120	1154	1132	1110	1128
79	720	816	812	856	817
80	772	746	738	730	660
81	1400	1390	1234	1194	1262
82	1705	1722	1704	1700	1682
83	1471	1518	1523	1547	1404
84	1336	1326	1304	1295	1270
87	890	800	754	790	770
88	755	574	517	472	320
89	787	749	745	746	600
90	803	855	835	826	810
91	870	892	900	910	832
92	767	757	740	732	723
93	1000	734	700	684	902
94	1318	1330	1338	1303	1233
95	382	410	417	427	322
96	1020	1017	1000	1000	965
97	357	367	357	360	237
98	650	580	520	480	500



**TABLE XXXVII**  
 COTTON GIN BEAM WAGE DATA

Date: 23 August 1946

Run Number: 4

Beam Span 7 feet

Load Position 1<sub>2</sub> feet from near support

Reading Number	Load (pounds)				
	500	2370	3495	4520	525
1	473	439	420	500	458
2	651	526	440	402	154
3	1237	1116	1034	963	1010
4	831	845	652	983	740
5	1230	1037	927	922	1220
6	732	578	430	450	755
7	786	809	343	241	755
8	541	567	230	200	531
9	780	606	538	435	745
10	348	883	822	897	821
11	541	732	712	611	754
12	935	822	720	631	738
13	1013	1103	1204	1323	1535
14	852	684	646	561	810
15	1129	1517	1370	1343	1140
16	862	744	690	627	300
17	548	523	530	530	522
18	1231	1153	1135	1165	1210
19	1047	851	379	629	1027
20	802	880	861	852	858
21	1034	1612	1560	1540	1600
22	1509	1322	1100	1156	1371
23	1582	1525	1821	1545	1551
24	251	890	330	870	921
25	1306	1310	1295	1295	1345
26	990	975	971	998	982
27	631	535	457	400	600
28	1341	1241	1190	1147	1326
29	1419	1400	1357	1340	1382
30	874	728	669	610	829
31	892	780	740	638	854
32	1220	1192	1177	1183	1190
33	330	615	611	630	581
34	1161	1036	1010	970	1142
35	730	745	734	734	747
36	1158	1180	1170	1167	1149
37	819	673	600	482	681
38	1147	1111	1070	1065	1035
39	1170	1141	1131	1205	1200
40	1101	566	862	615	990
41	1445	1248	1110	1078	1300
42	1515	1153	1135	1190	1512
43	1040	1001	86	935	1021
44	1081	1010	1042	1041	1042
45	650	706	717	701	600

5



# TABLE xxxvii (cont.)

ORIGINAL DATA

Run Number: 4

Date: 23 August 1946

Beam Span 7 feet Load Position 1.5 feet from support

Reading Number	Load (pounds)				
	500	2530	5475	4920	625
46	1281	1270	1260	1280	1245
47	1298	1281	1280	1291	1295
48	1028	1015	1022	1015	982
49	1110	1045	980	919	1043
50	1240	1105	1045	992	1102
51	1545	1280	1279	1274	1298
52	1043	995	992	999	1019
53	1250	1098	1040	979	1210
54	1593	1530	1516	1541	1557
55	1129	1112	1119	1130	1085
61	1236	1363	1413	1494	1250
63	527	563	551	541	593
64	543	551	533	634	500
65	907	990	1073	1140	877
66	852	842	873	900	700
67	1078	1060	1090	1106	1036
68	1430	1364	1397	1273	1420
69	1200	1348	1440	1523	1213
70	1333	1302	1302	1403	1249
73	1617	1653	1633	1714	1632
74	1373	1273	1280	1240	1328
75	905	1010	1133	1235	878
76	937	948	1000	1044	910
77	1142	1030	1000	950	1089
78	586	515	512	510	573
79	1087	1207	1307	1450	1120
80	1033	1013	1043	1071	992
81	1695	1565	1540	1514	1662
82	1130	1072	1087	1000	1102
83	1702	1220	1384	1925	1752
84	1657	1507	1517	1622	1617
87	1255	1132	1143	1183	1223
88	1104	749	905	840	1072
89	1375	1097	1135	1170	1078
90	1130	1132	1146	1138	1146
91	1102	1150	1195	1192	1156
92	123	87	80	83	83
93	1247	1197	1190	1180	1211
94	535	614	653	660	563
95	660	708	739	732	652
96	1530	1540	1356	1373	1532
97	645	632	653	662	672
98	980	802	820	792	915



**TABLE XXXVIII**  
UNOBTAINED TRIAL DATA

Run Number: 5

Date: 26 August 1946

Beam Span 5 feet

Load Position 14 feet from near support

Reading Number	Load (pounds)				
	000	2500	5000	4405	5500
1	381	473	407	513	450
2	610	520	460	400	631
3	1179	760	738	652	675
4	712	1112	1150	1308	1120
5	1222	1109	1046	988	1232
6	770	672	610	542	795
7	751	750	613	655	759
8	1147	1330	1260	1202	1455
9	730	660	522	548	732
10	728	653	662	870	809
11	640	652	603	736	656
12	634	600	855	608	1010
13	632	570	531	400	650
14	663	602	860	951	983
15	1430	1398	1372	1360	1440
16	817	898	650	591	802
17	460	459	461	460	460
18	1185	1180	1170	1163	1153
19	833	907	865	815	902
20	840	855	852	846	872
21	610	630	688	600	659
22	1424	1047	970	868	1130
23	1530	1530	1552	1536	1538
24	903	905	892	881	920
25	1328	1335	1321	1293	1350
26	940	983	991	1002	961
27	575	489	448	420	573
28	1315	1213	1200	1161	1323
29	1391	1417	1307	1392	1412
30	616	706	655	605	802
31	341	910	778	730	891
32	1135	1170	1168	1172	1148
33	488	525	530	541	520
34	1141	1112	1060	1038	1172
35	682	725	722	722	717
36	1105	1122	1122	1133	1110
37	1452	992	932	885	1072
38	1040	1017	1015	1017	1017
39	1110	1293	1292	1301	1311
40	1051	1260	1210	1168	1340
41	1365	1302	1320	1330	1341
42	1130	1199	1172	1160	1220
43	973	1130	860	807	992
44	1041	1072	1071	1072	1073
45	771	907	730	722	813





**TABLE XXXVIII (CONT)**  
**GENERAL TEST DATA**

Run Number: 5

Date: 20 August 1966

Beam Span 6 feet

Load Position 1, feet from near support

Reading Number	Load (pounds)				
	500	1000	1500	2000	2500
46	1210	1472	1682	1900	1242
47	1230	1268	1232	1261	1276
48	945	900	913	930	870
49	1027	846	613	578	699
50	1119	821	775	727	923
51	1308	1325	1318	1309	1358
52	979	1032	1030	1034	1047
53	1182	998	949	895	1100
54	573	629	631	642	640
55	1085	1115	1130	1143	1081
61	323	400	439	478	341
63	334	567	560	550	581
64	501	510	573	536	503
65	900	1004	1057	1107	910
66	350	591	593	643	590
67	850	930	937	926	870
68	1395	1372	1372	1362	1402
69	1231	1416	1483	1543	1301
70	1230	1718	1758	1800	1682
73	873	1003	1024	1043	953
74	1317	1163	1133	1145	1334
75	872	1119	1230	1337	1020
76	914	1327	1569	1394	1270
77	1023	900	935	905	1000
78	977	576	591	555	614
79	1140	1193	1272	1350	1094
80	1000	1047	1061	1080	1019
81	715	640	610	580	714
82	1085	1142	1143	1143	1132
83	805	830	930	966	820
84	680	705	707	708	708
87	1207	1208	1209	1237	1242
88	1090	873	830	795	987
89	1037	1210	1232	1262	1176
90	1117	1114	1117	1117	1120
91	1120	1132	1172	1193	1120
92	430	348	947	950	958
93	1134	1170	1107	1160	1180
94	1121	1182	1483	1520	1433
95	341	677	636	713	643
96	1323	1335	1343	1352	1330
97	643	662	673	681	643
98	914	888	837	843	828



**TABLE XXXIX**  
OBSERVED BEAM GAGE DATA

Run Number: 8

Date: 26 August 1948

Beam span 4 feet

Gage Position 1 feet from near support

Reading Number	Load (pounds)				
	0	2500	5000	7500	10000
1	1397	1445	1484	1489	1440
2	625	640	640	640	641
3	636	601	740	711	606
4	1113	1509	1321	1301	1190
5	1242	1104	1062	1082	1141
6	830	640	610	540	803
7	780	735	730	810	751
8	1436	1361	1315	1200	1465
9	610	719	670	605	609
10	336	828	636	848	601
11	960	872	835	600	857
12	1023	948	911	376	1021
13	668	620	600	570	662
14	1017	678	958	920	1018
15	1450	1404	1367	1362	1448
16	800	719	673	653	810
17	464	473	421	400	470
18	1196	1187	1190	1172	1191
19	926	918	878	842	909
20	890	858	854	841	872
21	962	640	600	621	630
22	1220	1095	1028	930	1210
23	590	590	590	590	589
24	924	908	800	941	950
25	1355	1337	1317	1320	1351
26	361	979	980	940	910
27	1341	1432	1432	1362	1340
28	1030	1234	1221	1187	1327
29	1418	1418	1393	1351	1413
30	727	730	360	610	670
31	872	632	810	710	871
32	1151	1189	1151	1090	1131
33	1431	1390	1400	1390	1431
34	1180	1150	1090	1060	1170
35	720	742	731	761	721
36	1122	1142	1152	1140	1112
37	1091	1090	960	913	1091
38	1027	1035	1038	1075	1036
39	1340	1345	1330	1338	1365
40	1452	1272	1233	1168	1352
41	618	441	430	370	631
42	1261	1260	1262	1260	1272
43	1008	1005	1008	1000	1010
44	1080	1078	1072	1083	1070
45	815	808	800	790	810



**TABLE XXXIX (CONT)**  
OCCUPY TRAIN GAGE DATA

Run Number: 6

Date: 22 August 1946

Beam Span 1 foot      Load Position 1/2 foot from near support

Reading number	Load (pounds)				
	500	2500	3500	4500	400
46	1248	1242	1312	1335	1212
47	1250	1243	1320	1298	1301
48	878	912	929	942	831
49	705	858	831	812	712
50	941	855	812	770	880
51	1342	1327	1317	1310	1340
52	1049	1050	1052	1033	1061
53	1092	1003	981	912	1102
54	822	820	812	825	831
55	1180	1129	1149	1171	1081
61	1250	1227	1300	1316	1245
63	595	582	578	577	599
64	500	533	547	559	499
65	895	967	933	1024	850
66	1552	1575	1500	1610	1547
67	875	913	934	963	878
68	1412	1307	1325	1390	1415
69	1282	1382	1433	1480	1283
70	700	703	792	822	982
73	912	1003	1026	1053	953
74	233	228	210	137	270
75	1005	1142	1207	1273	999
76	1262	1323	1348	1373	1382
77	1000	943	921	897	1005
78	612	575	568	552	616
79	1042	1180	1239	1300	1045
80	1017	1044	1035	1090	1013
81	647	626	537	536	639
82	1117	1128	1130	1123	1140
83	812	878	909	937	810
84	705	704	703	703	705
87	1137	1170	1177	1193	1203
88	932	830	812	762	961
89	1170	1204	1220	1232	1163
90	1131	1129	1151	1135	1132
91	1122	1166	1167	1210	1119
92	903	962	900	960	962
93	1202	1190	1180	1192	1202
94	1422	1474	1497	1522	1422
95	1532	1606	1612	1612	1581
96	1333	1340	1343	1343	1332
97	1583	1628	1645	1663	1588
98	937	912	901	887	935



**TABLE XL**  
OUTRAV STRAIN GAGE DATA

Run Number 7

Date: 20 August 1960

Beam Span 7 feet Load Position 2½ Feet from near support

Reading Number	Load (pounds)				
	470	915	3555	4480	501
1	1510	1352	1370	1339	1303
2	1510	1330	1315	1255	1483
3	820	859	832	522	739
4	1030	1071	1038	1121	1011
5	1177	971	872	750	1132
6	817	654	542	421	730
7	1622	1655	1701	1749	1539
8	1331	1125	1072	925	1230
9	932	800	639	410	781
10	772	953	939	1157	940
11	630	700	581		420
12	1303	1198	927	433	365
13	1423	1278	1185	916	1221
14	1670	1458	1355	942	1300
15	1320	1339	1316	1297	1277
16	730	655	500	545	731
17	1303	1513	1371	1329	1322
18	1110	1103	1076	1051	1115
19	920	839	798	722	921
20	770	760	739	734	772
21	1225	1502	1420	1450	1222
22	1410	1302	1240	1182	1410
23	1402	1431	1321	1482	1475
24	847	828	818	910	841
25	1200	1340	1250	1221	1255
26	878	827	905	911	872
27	1439	1353	1315	1282	1420
28	1257	1159	1121	1126	1222
29	1360	1349	1344	1338	1353
30	719	629	582	542	720
31	722	589	486	639	330
32	970	971	941	868	680
33	1227	1267	1332	1476	1451
34	1175	951	820	571	840
35	1475	1321	1261	1101	1002
36	933	966	1016	1105	1076
37	1022	935	882	859	1020
38	910	909	752	816	910
39	1225	1222	1265	1278	1212
40	1440	1470	1432	1401	1338
41	1520	1416	1329	1319	1521
42	1127	1183	1122	1201	1125
43	675	730	717	650	632
44	300	1022	1020	1011	381
45	712	740	720	712	712





# TABLE XL (CONT.)

DETERMINED STAIN AGE DATA

Run Number 7

Date: 30 August 1946

Beam Span 7 feet

Load Position 1/2 feet from near support

Reading Number	Load(pounds)				
	475	2495	5535	4420	595
46	1110	1019	972	942	1130
47	1151	1140	1160	1160	1170
48	867	861	859	855	864
49	671	597	541	500	678
50	671	683	862	860	871
51	1319	1312	1309	1302	1318
52	874	870	871	875	872
53	1020	931	889	849	1021
54	1438	1480	1468	1471	1460
55	951	900	852	792	886
61	1749	1462	1360	1142	1550
63	1415	1368	1335	1196	1304
64	429	540	692	1025	710
65	955	1207	1368	1313	803
66	1073	1157	1121	1235	1114
67	469	442	410	355	423
68	1267	1219	1104	1108	1225
69	675	513	1010	1367	510
70	617	698	738	733	616
73	830	780	755	715	835
74	1116	1093	1077	1052	1122
75	940	1115	1202	1263	950
76	1220	1275	1300	1303	1223
77	930	873	844	803	937
78	513	492	455	462	510
79	1033	1154	1213	1248	1040
80	946	975	990	982	949
81	1563	1501	1466	1422	1570
82	1019	1003	1002	967	1017
83	740	803	840	947	743
84	633	633	633	610	634
87	1072	1050	1050	1037	1073
88	967	866	822	765	972
89	1148	1163	1197	1110	1155
90	1000	1103	1014	1000	1022
91	935	1031	1050	1077	1021
92	780	767	744	749	784
93	1050	1020	1002	937	1020
94	1225	1302	1335	1410	1222
95	570	607	715	832	708
96	1240	1274	1293	1323	1290
97	547	553	553	512	530
98	836	726	663	483	723



# TABLE XLI

OF SWAY TABLE DATA

Run Number: 6

Date: 31 August 1946

Beam Span 6 feet

Load Position 2 1/2 feet from near support

Reading Number	420	480	547.5	610	680	750
1	1315	1348	1330	1270	1277	1313
2	1302	1308	1330	1278	1261	1246
3	891	715	600	332	536	813
4	1021	1105	1138	1111	1139	1020
5	1170	971	934	813	836	1140
6	920	681	572	432	441	732
7	650	838	760	730	1140	970
8	1260	1078	971	875	1333	1017
9	892	680	570	470	1005	1021
10	945	1000	1178	1148	1062	1050
11	1411	1208	1110	1005	1348	1198
12	837	700	602	498	1047	1033
13	1252	1016	975	376	253	709
14	1300	1315	1121	1021	320	832
15	1270	1241	1322	1302	1271	1377
16	736	613	605	501	500	732
17	1308	1310	1218	1531	1362	1306
18	1110	1103	1068	1001	1061	1112
19	723	819	812	773	725	921
20	732	760	752	751	750	731
21	1440	1509	1409	1482	1470	1387
22	1420	1322	1260	1215	1147	1411
23	1475	1480	1480	1470	1480	1475
24	841	925	813	610	728	837
25	1200	1240	1231	1210	1202	1242
26	871	890	818	108	615	870
27	1450	1353	1321	1285	1248	1425
28	1231	1172	1160	1095	1043	1225
29	1387	1548	1545	1532	1441	1387
30	722	732	632	555	445	715
31	1030	1123	1068	1090	1200	2242
32	875	880	805	651	640	760
33	1440	1430	1470	1486	1755	1420
34	660	727	602	532	1001	1232
35	1307	1215	1130	1122	432	823
36	1378	1090	1018	1135	1281	1246
37	1035	945	850	632	762	1128
38	913	819	770	720	651	887
39	1220	1232	1200	1273	1289	1221
40	1310	1477	1442	1410	1398	1558
41	1520	1430	1384	1338	1170	1523
42	1168	1181	1189	1168	1200	1163
43	825	742	730	653	401	704
44	380	1012	1029	1010	1080	950
45	742	730	720	711	710	732



# TABLE XLI (CONT.)

37. WIND TUNNEL DATA

Run Number: 3

Date: 30 August 1948

Beam Span: 4 feet      Low Position: 2 feet from rear support

Reading Number	Load (pounds)					
	400	540	647.5	710	840	910
46	1189	1045	1002	949	881	1120
47	1170	1181	1132	1130	1180	1160
48	865	860	830	851	843	868
49	809	827	867	816	855	879
50	872	866	881	880	889	870
51	1315	1310	1305	1300	1311	1318
52	872	868	860	889	878	871
53	1080	980	901	860	803	1022
54	1408	1451	1456	1488	1472	1460
55	881	871	882	912	720	828
61	1810	1808	1785	1877	1828	1970
63	1307	1255	1230	1208	987	1090
64	778	881	935	937	1738	1457
65	783	1010	1123	1247	844	294
66	1073	1145	1181	1220	1717	1508
67	400	870	388	547	803	378
68	1154	1172	1140	1188	982	1110
69	841	1112	1220	1337	1105	486
70	1556	1832	1860	1702	1747	1555
73	834	780	760	735	707	830
74	1193	1092	1082	1069	1267	1119
75	945	1022	1162	1246	1386	943
76	1217	1267	1230	1310	1339	1220
77	837	877	850	824	720	936
78	1476	1452	1448	1438	1457	1481
79	1030	1110	1110	1240	1307	1035
80	945	870	862	962	1001	945
81	1563	1320	1476	1448	1110	1568
82	1018	936	876	865	1008	1013
83	1335	1745	1774	1800	1931	1687
84	1578	1579	1578	1573	1581	1578
87	1071	1062	1032	1032	1052	1068
88	877	885	825	783	732	970
89	1146	1179	1130	1202	1210	1150
90	1080	1017	1016	1014	1027	1027
91	1013	1065	1067	1110	1153	1080
92	778	735	757	742	720	754
93	1020	909	974	960	900	973
94	383	410	445	483	680	484
96	680	781	820	860	1113	895
98	1285	1313	1327	1312	1443	1360
97	530	547	551	558	562	530
98	728	652	582	529	513	490



APPENDIX F  
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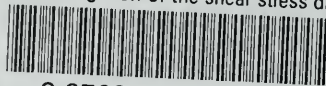
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